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Vol. VII. NEW YORK, JANUARY 30, 1886. No. 5.

THE blessings of the telephone are to be further extended by placing it in small-pox hospitals, by which means outside parties can without dread of infection, converse with relatives and friends confined as patients.

REPORTS again find currency that Mr. Garrett and Mr. Gould are working together in railroad matters, and that Mr. Garrett will offset Mr. Gould's railroad concessions by handing over the Baltimore & Ohio telegraph service to the Western Union And with the reports go the denials as usual.

AT last London is to have a central station for incandescent lighting, although some difficulty has been found in raising the necessary capital. The scheme promises to be a commercial success. There can be no doubt that such a station would have existed long ago but for adverse legislation, which made, and even still makes, the establishing of electric light enterprises for public lighting anything but an inviting investment. This pernicious legislation will probably soon be repealed or revised, and it is in anticipation of this, perhaps, that the new enterprise is started.

WE call the attention of our readers to the grand prize offered by the French Academy of Sciences on the subject: "To perfect in some important point the theory of the application of electricity to the transmission of power." The prize will consist of a gold medal of the value of three thousand francs. This prize was proposed in 1884, and the memoirs will be received up to June 1 of this year.

THE New York Bowery is one of the best lighted streets in the world; in fact, the only thoroughfare that compares with it for brilliancy by night is Broadway. Electric lights are freely used on both, and hence the cheerful splendor before which the dingy gas lamps pale their ineffectual fires. But while they like the light, some of the Bowery storekeepers want it at a lower rate than they now pay for the arcs. One restaurateur has very wisely put in his own plant. The philosophy of the movement is expressed by a German hotel proprietor, who says: "Eny man what lowers de price is mein frent."

THE city of East St. Louis, which recently had a telegraph company fined $50 and costs for maintaining "a nuisance" in the shape of poles and overhead wires, might as well read up the latter day history of Philadelphia in that connection. The telegraph is progressing steadily, but even in the most enlightened age we shall doubtless still have the same old spectacle of the industrious old woman, with her pattens and broom, attempting to sweep back the rising tide. East St. Louis is not of much account anyhow, and it might be cheaper to withdraw the wires altogether, and let such of her citizens as want to use the telegraph, swim across the Mississippi to St. Louis. As East St. Louis could not pay its officials the other day, it is probable that the idea was to raise the needed money at the expense of the telegraph company.

NOT long ago, some of the high ecclesiastical authorities of the city of Rome objected to the use of the electric light in one of the churches there on the ground that the light was "sacrilegious." No reasons were given for this remarkable objection, probably because there were none to offer. An incident now occurs in Mexico that may mitigate the prejudice in the Eternal City. A thief formed lately a scheme for robbing people in attendance on a festival at the Cathedral of Cotopaxi, by extinguishing the electric lights. In his endeavor to break the circuit, however, he diverted the current to himself, and was killed instantly. Hence, it would appear that the electric light is a protector of churches and worshipers from sacrilege, just as in the streets and squares of our cities it is a protector of property and the public from other crime.

IT is proposed to form a mutual fire insurance company, to be known as the Electric Light Mutual Insurance Company, comprising all the local electric lighting companies; and we print in this issue the important and very business-like circular issued by the promoters of the plan, themselves actively engaged in electric lighting. There is a great deal to be said in favor of such an organization, and we have no doubt that it will receive such attention at Baltimore in February as will lead to the formation of the company. A station properly built and equipped is a good risk, and anything but "extra hazardous," as the record shows on impartial examination. Besides, the companies will see to it that all the mutuals observe the necessary precautions. We hope our electric light readers will take the trouble to answer promptly the questions put, and to return the papers without delay.

WE publish to-day several communications in regard to the tests of incandescent lamps and dynamo-electric machines by the Franklin Institute. It will be seen that the Institute, through its President and Prof. Marks, makes a very pertinent answer to the criticisms leveled at the tests, and that Mr. Prescott also wields the weapons of defense in their behalf most vigorously. Of course, the fact remains, unfortunately, that, as alleged, the Woodhouse and Rawson lamps were not directly submitted for test by the makers; but Mr. Tatham's explanations must be accepted as exonerating the Institute from blame or suspicion. As to the second point of objection raised by Mr. Heinrichs, it will be seen that there is something to be said on the other side, which he will probably find it hard to controvert. It is well that these matters should thus have been openly discussed, and, we hope, settled.

SOME years ago the telegraph operators out West used to astonish us with descriptions of the multifarious duties performed at certain stations by one member or other of their craft, the said duties ranging from station agent and telegraph operator to yard-master and tank-man. The worm, even, will turn, and now the East brings forth Mr. Geer, of Manchester, Conn. Mr. Geer sells tickets at Manchester, boards the train and acts as conductor to South Manchester (three miles), where he resumes his telegraphing and ticket-selling for the return trip, when he once more acts as a conductor. The road transports about 400 passengers and 110 tons of freight daily. Mr. Geer writes equally well with both hands, though the excellence of his copy is not stated. He is thus at one fell swoop conductor on the road and telegraph operator, freight agent and ticket agent at *both* ends. The Western Pooh-Bah will find this hard to beat.

ACCORDING to one of the New York reporters, Miss Juch, while singing last week at the Academy of Music, was severely wounded in the head by a falling "electric light tank." We have always opposed the use of these tanks. The current ought to be stored in lighter receptacles, such as old hat boxes, or even water-tight egg boxes. Besides, the practice of putting in a heavy current is to be deprecated. In time its weight will break down the staunchest support, and then the current gets spilled all over the place, irretrievably staining everything it touches, while the tank itself, being generally composed of cast iron, is apt to inflict injuries of a serious nature. Another objectionable point is that these ponderous tanks are slung overhead. They ought to be put under ground or under the boards, and send their light up through glass or mica. But, after all, was it an "electric light tank" that did the mischief this time? Probably not.

DEEP interest continues to be taken by a great many parties in the adoption of plans for putting the wires under ground in this city, and it would appear that surprise is felt in some quarters that the large electrical corporations interested should desire to have some sort of control of the system to be operated. The New York *Times* claims to have discovered that in the "combination" scheme which the Subway Commission will adopt, the Dorsett system will be represented, as well as the Williams, the Bentley-Knight and others, and that the Western Union Company, the American Bell Company, the Metropolitan Telephone Company, and other corporations will have a finger in the pie. All this is natural enough, although our esteemed and energetic contemporary has certainly scored "a beat" against the other dailies in getting so near to the truth while they have had scarcely anything to report on the subject. The companies we have named could not well afford to be left out in the cold, but, of course, the press as well as the city authorities should oppose any plan the adoption of which will exclude any of the electrical companies from benefits that should be open to all. Thus, the Baltimore & Ohio Telegraph Company and the United Lines must be treated on an equality with the Western Union; and there is no excuse for making any distinctions between the Brush, Weston, Thomson-Houston, Wood, Edison, Sawyer-Man and other systems. After all, there is a little of the grotesque in the eagerness with which some of the companies are now trying to get into the swim, when but a few months ago they protested so earnestly that they wanted to have nothing to do with underground wiring, as it was utterly impracticable.

A GREAT many opinions are being expressed with more or less oracularity, as to the result of the suit that the government may bring to test the validity of the Bell patent, and as to the probable effect of an adverse decision. We have endeavored to present both sides of the case in our columns, as we have before sought to make clear by illustration and description the main points of interest in the instruments put forth by sundry inventors of varying repute and said to infringe the Bell patent. There is no need to go again over the much-trodden ground, but we take the opportunity of quoting the utterances of an official in the Patent Office as to the possible effect of "breaking the monopoly." "I don't think," he says, "that a decision adverse to the Bell patent would injure that company materially or aid the other companies which have inventions. Especially would this be true if the broad brinciple was laid down that the process of transmitting articulate speech by an undulatory current of electricity was not patentable. Then any telephone could be used, and a man could run a wire from one point to another without interfering with patented rights. But, when you come to join on to another wire, then you come again into the region of patented rights, and here the Bell Company is supreme. For several years past it has bought up all the patents of any importance that have been issued for the various parts of a telephone. For instance, the Bell Company owns the Blake transmitter, which is the broad underlying patent in telephony, the object of which is to vary the rises in electric currents by changing the conducting surfaces between two carbon contacts. Then they also own the Berliner induction patent, which is in use in every telephone box in the country, by which the low-tension battery currents are transferred into high-tension currents over outlying circuits. They control the patent for the switch appliances by which, when you lift the receiver from the hook, the battery is thrown into circuit for use in transmitting, and at the same time the bell is cut off. The leading patents in telephone calls, switch-boards, bells and general appliances for use in central stations are also owned by the Bell Company; so that you see the original patent is of little consequence, as the telephone is now used. The methods by which the principle is made practical are all patented, and the most valuable of these are controlled by the Bell Company." This is rather overdrawn, but all impartial men will admit that it summarizes tersely the difficulties of the "opposition" companies,

An Experiment in Pyro-Electricity.

M. E. Dorn, in *Wiedemann's Annalen*, has given the following experimental proof of the law that both electricities are developed at the same time and in the same quantities for pyro-electricity. According to the *Phil. Mag.* he says: "That both electricities are produced in equal quantities in all cases of electrical excitation is a principle generally admitted, though the experimental proofs are not numerous. It appeared to me desirable, therefore, to prove the above principle for pyro-electricity, particularly as here an apparently paradoxical case occurs. If a crystal of tourmaline is warmed at one end and then rapidly passed through the flame, it is first found to be almost entirely unelectrical. As it cools somewhat, considerable disengagements of electricity occur, which are occasionally *of the same kind at both ends.* The above principle requires that the same kind of electricity occur in equal quantity on the lateral faces or in the interior of the crystal. A test is furnished by the principle that a quantity of + electricity in the interior of a shell shaped conductor would induce — electricity on its inner and + electricity on its outer side, whatever was the distribution of the original + electricity. If the tourmaline, after being heated, is brought inside a conducting but insulated hollow body, an electrometer connected with the latter should show no signs of electricity as the crystal cools. The arrangement of the experiment was as follows: A brass cylinder, 4 centimetres in height and 2 centimetres in diameter, was supported on a rod of shellac, and had a lid which could be lifted off by means of an insulating rod of shellac. A third rod of shellac was fixed to the under surface of the lid, and in it was fused a thin brass wire which was wrapped round the tourmaline. The tourmaline used was of a green color, very transparent, fractured on both sides, and for a length of 2.05 centimetres weighed 1.59 gramme. One pair of quadrants of the electrometer was put to earth. A volt was represented by a deflection of about 2.5 centimetres on the scale, at a distance of 130 centimetres, which was sufficient for the present purpose. It was more important that the insulation of the one pair of quadrants should be good, and that it should not receive a charge from the movable part of the electrometer, or from the air in the room, than that the electrometer should be very sensitive. These conditions were more than sufficiently satisfied. For when electricity was imparted to the insulated pair of quadrants, the deflection only sank in forty minutes from 14.0 to 13.3; and further, after insulation for three-quarters of an hour without charge, there was a deflection of 0.4 centimetre. The shellac rod which supported the cylinder also insulated well; for after being connected with the insulated pair of quadrants, the deflection sank in eleven minutes from 38.2 to 30.4. The capacity of the insulated pair of quadrants was found in several experiments to be about seven times as great as that of the cylinder. In the experiments, the second pair of quadrants, from which a wire passed to the cylinder, was connected with that to earth. The lid with the crystal was raised, the latter heated in one end of the flame of a Bunsen burner or spirit lamp, again brought into its place, and the connection with the two pairs of quadrants rapidly broken. However the heating was arranged, no deflection was ever obtained which exceeded the uncertainty of the instrument, although the quantities of electricity developed were often considerable, and were frequently of the same kind at both ends. From a long series of experiments I select the following: When the crystal was heated at one end, and after a minute removed from the cylinder, the proof plane applied to the crystal and then to the insulated pair of quadrants showed negative electricity at both ends, the deflections at the top and bottom being 3.0 and 7.50 centim. respectively. In another case there was no apparent electricity at one end, while that of the lower sent the image out of the field. If the duration of heating was somewhat greater, and the crystal remained longer in the cylinder, there was on the top positive and on the bottom negative, and of such strength that often, on raising the lid with the crystal, the luminous image disappeared from the scale, which is simply explained by the fact that part of the electricity induced on the cylinder is removed with the lid."

The Cowles Company.

Reports from Lockport, N. Y., state that the Cowles Electric Smelting Aluminium Works there are being constructed with great vigor under the direction of Mr. Harry Abbey, C. E., with Mr. L. A. Dietrick, architect and building superintendent. The main building will be about 45 by 200 feet. Attached to the side of this and running on the same line of wall at the upper end will be the dynamo building, 20 by 100 feet, and the wheel-house, 35 by 100 feet. The design for covering these buildings is somewhat novel. A bow-string truss will cover the three in one grand span of 101½ feet. The roof will probably be of iron. The side elevation gives the appearance of two buildings, while the end elevations appear as one building three stories in height. All buildings are to be of stone laid in broken ashlar. It is the intention of the company to put in the most improved machinery, much of the more important of which will be built especially for these works. The building of the canal and such work is under the supervision of Mr. Hiram Lusk. Mr. Birdsall Holly, of Lockport, is the hydraulic engineer for the company, and has supervision over the work, making many improvements in the attaining of proper motive power.

A Skeleton Bell.

The accompanying illustration shows a new "skeleton" bell made by Messrs. Tucker & Baxter, of Brooklyn. One advantage claimed for this type over others sold at as low a price is that it has an iron frame which does not warp,

A SKELETON BELL.

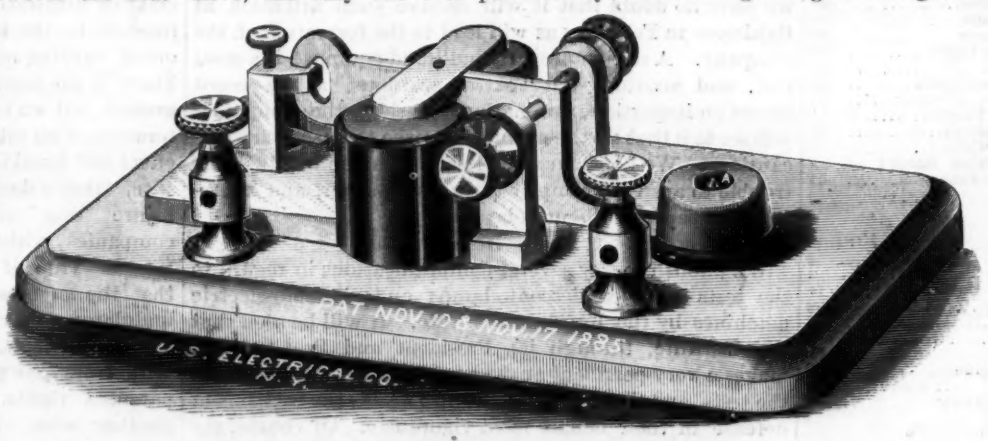
thus throwing the contact points out of adjustment. Another feature of merit is that there are no small pivot points to corrode, with consequent liability to imperfect working and to breakage.

The use of three binding posts, as shown, with the necessary connections, allows of the utilization of the apparatus as either a vibrating or a single stroke bell. It can also be used upon two distinct circuits without any possibility of the one interfering with the other.

Another important advantage is found in the adjustable sleeve which supports the armature, thus avoiding the necessity of bending a spring to secure the desired position of the armature—the length of stroke being provided for by the usual adjusting screw. It is remarkable that this mechanism, contrived ingeniously "a double debt to pay," should be so simple and durable in all its parts.

The Sensophone, or Touch-Sounder.

We illustrate herewith an instrument which is, we believe, the only one ever perfected by which a telegram



THE SENSOPHONE, OR TOUCH-SOUNDER.

can be received by means of the sense of touch, the eye or ear having been relied upon up to the present time.

If the finger be placed upon the touch-point *A*, this receiver, or "sensophone," or "touch-sounder," or "silent-sounder," will deliver the message to the operator by a series of light pricks, due to the movement of the vibrating needle, and identical as to interpretation with the ticks made by sound. Some experts who have tested the instrument affirm that with it they can receive faster and with greater accuracy than by sound. To those who are accustomed to read by sound, it offers no obstacle or difficulty, and they will find that the method is agreeable; perhaps they will prefer it to the others. On the removal of the finger, the instrument resumes its functions as a normal, perfect sounder, so that two senses can be used with it. Patents have been obtained on the instrument in the United States and foreign countries.

The importance of the invention will be learned from the claim made for it that this employment of another sense in the art of telegraphy offers a new field of usefulness to more than 100,000 deaf mutes in this country alone. In compensation for their loss of hearing and speech, these persons have developed to an abnormal degree the sense of touch; and this combined with their perseverance and their utter indifference to surrounding disturbances should go far to place them in the front rank of telegraphers. It is, too, a remarkable fact that not one per cent. of our population possesses perfect hearing. Yet this sense of hearing, so easily imposed upon, has been selected by the inventors and improvers of telegraph instruments as the only one through which communication can be correctly received; notwithstanding the fact that many operators have been compelled to seek other means of obtaining a livelihood in consequence of a deafness caused by the incessant tick of the sounder. On the other hand, the sense of touch is the most acute and dominant of all, which is often demonstrated by its increase in proportion as the others decay. Dr. Geo. Wilson, the eminent Scotch physiologist, says: "The organ of touch as embodied in the hand is the most wonderful of the senses. The organs of the other senses are passive; the organ of touch alone is active."

It will be seen, therefore, that several advantages can be claimed, as they are, for this instrument. First, that it is secret, it being the only one by which a message can be received in silence. Second, that it is a perfect sounder, if so desired, on the old plan. Third, that it opens up a new field of employment for deaf-mutes. Fourth, that touch-telegraphy can be learned in less time than is required with sound. Fifth, that the distracting confusion of sound is avoided. Sixth, that it is extremely compact and simple. Other recommendations might be named, such as its moderate price, but enough has been said to show that the "sensophone," as it is called, is worthy a warm welcome. The instrument is made and sold by the United States Electrical Company, of this city.

Taxes of Electrical Corporations in New York.

Controller Chapin, of New York State, in his annual report to the Legislature, says in relation to the tax on corporations, that the effect of recent legislation, as well as of judicial decisions, has been to wipe out nearly all resistance to this tax. The case of the Western Union Telegraph Company is, however, a notable exception. The efforts of that corporation since 1880 to evade the payment of its State taxes are recited, and the fact that a judgment for $179,371 was procured by the State against the company in the fall of 1883 and affirmed by the Court of Appeals in 1885 is recalled. The Controller remarks: "The amount due upon the judgment is at present about $132,000. It is not possible, under the Code of Civil Procedure in its present form, to assist an execution against a domestic corporation by supplementary proceedings, either during the pendency of such execution or after its return. In this respect such corporations enjoy an immunity which is not accorded to private individuals. Perhaps it is just that they should enjoy such immunity; but it is not right that such exemption should operate to the prejudice of the people of the State that grants the franchise. I therefore submit herewith to your honorable body an amendment to the Code of Civil Procedure (schedule 19), which should be speedily passed, and which will give the right in all actions where the people are plaintiffs to resort to supplementary proceedings after judgment has been rendered and execution issued. This judgment should be paid. Justice to the numerous corporations which complied with the law, while this company was seeking to evade it, demands such payment. The interests of the public treasury demand such payment. The good faith of the stipulation demands it. What has been here said of the Western Union Telegraph Company applies to the Gold and Stock Telegraph Company, against which corporation the claim of the State is much smaller."

Another act which the controller thinks needs perfecting is Chapter 499 of the Laws of 1885, which provides for placing electrical conductors under ground in cities of more than 500,000 population, and which also provides for a commission. Under this act the Commissioners are to receive salaries, and their expenses are to be paid by the Controller of the State. On this subject Mr. Chapin says: "There is no appropriation in the bill, and, furthermore, although the Controller is authorized to assess and collect from the various telegraph, telephone and other electrical companies the amount of the salaries and expenses, no sufficient power is conferred upon him, nor is any penalty imposed upon the companies for non-compliance with the law or with any demand that the Controller may make upon them. The Commissioners' salaries and expenses therefore cannot be, and have not been paid, because certain companies, among them the Western Union, refuse to make returns of their mileage, upon which return any assessment must necessarily be based. This department will not pay such salaries and expenses out of the public Treasury. Unless, therefore, your honorable body so amends this law as to make the salaries and expenses of the commission payable out of the proceeds of an assessment upon the companies, at the same time

providing for the collection of such an assessment, the prospect is that the law will be entirely ineffectual. The act was passed ostensibly to carry out the provisions of Chapter 534 of the Laws of 1884, which provided that the wires of such companies should be placed underground before Nov. 1, 1885, in cities having a population of over 500,000. Whether the policy indicated in these two laws shall prevail or be abandoned is not for this department to determine. But it is the duty of this department, as well as of your honorable body, to see to it that this imperfect legislation be not made a basis for claims against the State for services not rendered to the State."

Notes on Electrical Invention and Patents in 1885.

BY EDWARD P. THOMPSON, M. E.

TELEGRAPHY.—In spite of the telephone and the science of telephony, lately so completely developed, improvements upon the devices and systems pertaining to telegraphy are on the increase, especially in regard to multiplex telegraphy and printing telegraphs. The fear that telephony would replace telegraphy is dying out as quickly as the fear that the electric light would annihilate all the gas companies. The chief patents taken out related to the Delany system.

TELEPHONES.—Improvements have related largely to the insertion of granulated carbon between the electrodes for the purpose of obtaining a truer imitation of the human voice and of increasing the amplitude of vibration; also to switch-boards and other elements of a telephone system, whereby the number of movements of the operator and subscriber has been reduced and the several switches, signals, and cut-outs, caused to act automatically; also to telephones applying the principle of the production of a vibratory current by the alternate opening and closing of the circuit, instead of an alternate increase and decrease of the resistance of a continuous current. Invention has likewise been directed to mechanical telephone systems as substitutes for electrical telephones on circuits of short lengths, and adapted to be employed in smaller towns and cities and in large factories, the improvements relating particularly to means for carrying the vibrations around corners.

ELECTRIC GENERATORS.—Improvements have related to all classes of generators, including thermo-electric generators, which subject, however, stands in the background, while dynamos seem to have received the most attention. Patents are probably the best authority in judging of the direction in which inventors are working; accordingly we find that one of the objects sought, and accomplished with apparent effectiveness in some instances, is the building of dynamos in which the parts in any two are exact duplicates, so that the machine, as a whole, may be constructed in the manner of clock-work or sewing machines, thereby greatly reducing the cost of construction. The principle of regulation by automatic variation of resistance in a shunt to various elementary circuits of the dynamo has been applied in a multitude of ways, the object, as far as improvement of construction is concerned, being to provide a self-regulating dynamo where the regulating portions need no more attention than the field magnets do themselves.

In most of the devices it is proper to remark in criticism that the regulation takes place after the irregularity in the same manner that an automatic fire extinguisher puts out the fire after the latter has already done *some* harm. The matter should be attacked at the beginning, so as not to rectify irregularity, but to prevent it beforehand.

ELECTRIC LIGHTING.—Improvements have been attempted in the direction of running both arc and incandescent lamps on the same circuit without the aid of the secondary chemical battery. The difficulties to be overcome are numerous, and the field is still open for invention in such a distribution of the energy that it may be drawn off here and there in any quantity or intensity in the same manner that water is supplied from city reservoirs.

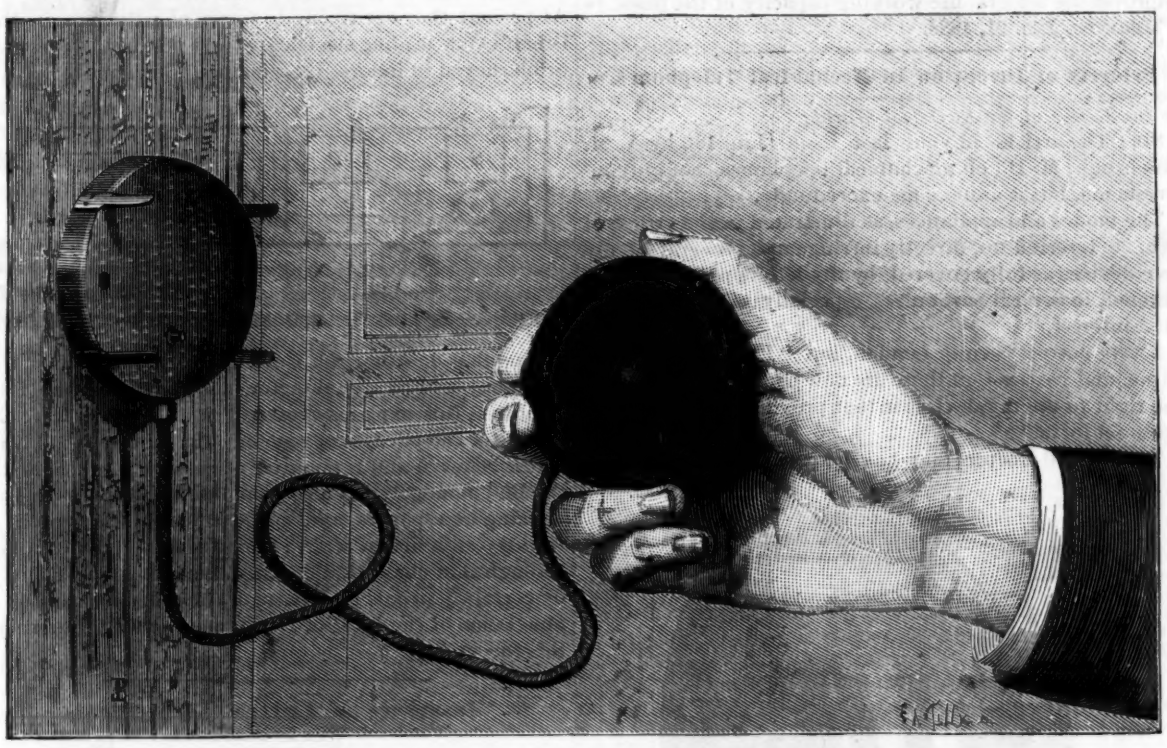


FIG. 1.—THE BUTTON TELEPHONE IN OPERATION.

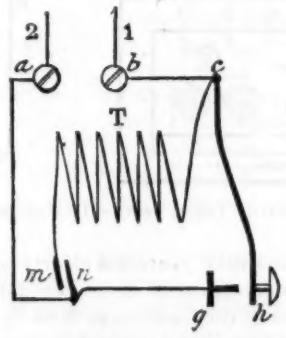


FIG. 2.—DIAGRAM OF CIRCUIT.

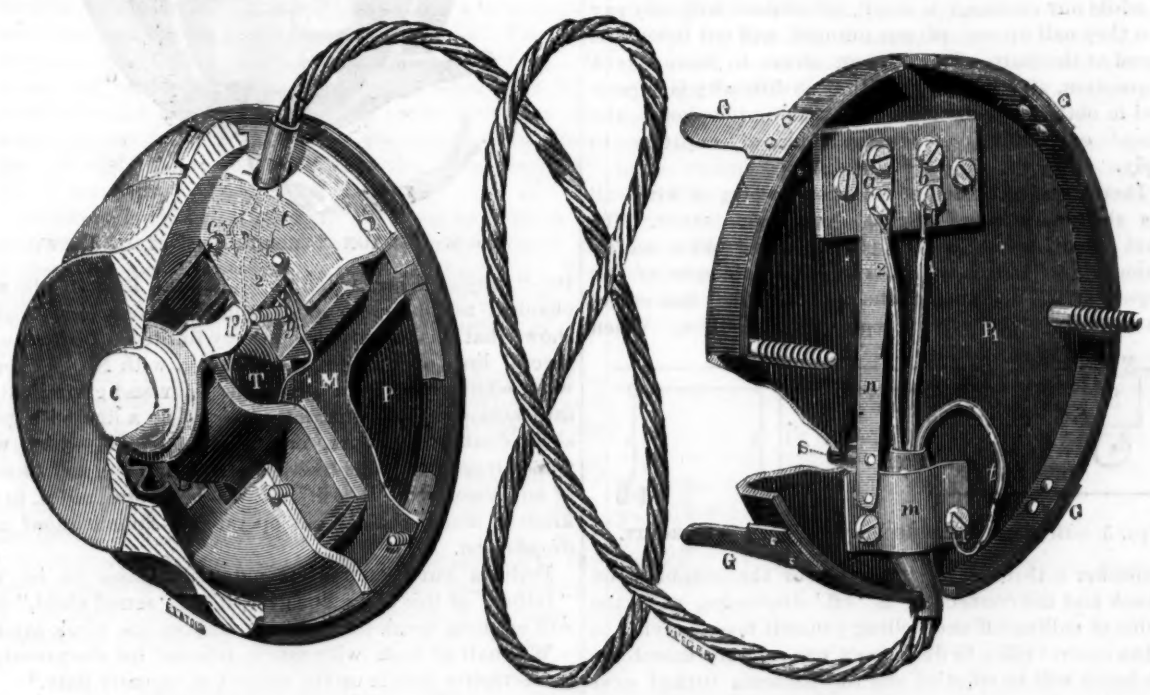


FIG. 3.—DETAIL VIEWS.

Very many patents have been granted for improvements in arc lamps, but very few relating to incandescent lamps; the latter having already attained such a state of efficiency that improvements are naturally needed chiefly in the former, some of which continue to flicker, to hiss, to fail completely at intervals, to need daily and skillful attention, and to be defective in other ways well-known to those who have been most closely interested in the same. Inventions in this line might come more freely than they do from those who operate the lamps.

MISCELLANEOUS.—During the past year electricity has been applied as a substitute force for mechanical, chemical and heat energy. We find it employed for the operation of valves, for indicating all kinds of changes and operations at a distant point, for detecting and automatically arresting burglars, for assisting in batching eggs, for regulating the heat of our dwellings, and it is making slow but sure progress in medical and surgical treatments. In some way or another, all these points were dealt with by inventors in 1885, and there is every prospect of an increased number of electrical inventions in 1886.

The Button Telephone.

The rapid increase in the number of instruments used in the present exchange system, almost the only extensive department of telephony, is but a slight indication of the enormous development that will be attained when the telephone shall have become public property. There is no reason at all why every speaking tube, call bell and similar means of communication should not ultimately be replaced by a speaking telephone. In fact, the telephone is applicable in so many situations outside the exchange system, that it is strange that no effort has been made in this country by those who control it to enter the large fields that lie invitingly open to them. The use of the telephone in the hotel or the house, for instance, is destined to become a great factor in its future. This has already been recognized by French electricians who, with commendable enterprise, have worked out a telephone system which shall take the place of the ordinary call bell circuit, and which has, indeed, been devised with special reference to the utilization of such circuits as they already exist.

The "button telephone," which is used for this novel purpose, is not an invention in the true sense of the word; it is a happy combination, rather, of elements already known and in practical operation; and it has been designed, as above stated, for the purpose of converting at small cost any and every call-bell circuit into a telephone circuit.

The button telephone is shown in actual size and partly in section in Fig. 3, while Fig. 1 represents it as it appears in actual operation. The apparatus, as will be seen, consists of a base fixed to the wall, or upon a board, and of a movable part which is taken in the hand when the telephone is to be used. These fixed and movable parts are connected by a triple conductor cord.

The base, as shown at the right of Fig. 3, consists of a metallic plate *P*, provided at its rim with four springs *G*, adapted to retain the movable part shown in the individual's hand in Fig. 1. The plate is suitably fixed, as, for instance, by two screws, upon the wall of the dwelling. The two terminals, *a* and *b*, serve to receive the wires, which, as usual, are so arranged as to be operated by the button of the ordinary apparatus. From these terminals extend two wires, 1 and 2, which, together with a third wire *t*, communicating with the metallic contact piece *m*, pass to the movable part of the apparatus. Upon this contact piece rests the spring *n* provided with the projection *S* which protrudes from a hole in the plate *P*, so that when the fixed and movable parts are put together the contact between *m* and *n* is broken, while *m* and *n* touch as soon as the movable part is taken into the hand for use. The movable or button part proper comprises essentially a telephonic receiver, having a diaphragm *M*, coil *I*, shown also in Fig. 4, and a spring *h* placed opposite the contact *g*, all inclosed in a box as shown partially in cross-section. The spring *h* is electrically connected to the mass of the instrument, while the contact *g* is insulated therefrom. The electric circuits are disposed as shown in diagram in Fig. 2, where similar letters represent similar parts.

There are three cases to which the system is applicable:

1. That in which one person can call a second without an annunciator, but where the second can not call the first.
2. That in which one person can call a second with an annunciator, while the second cannot call the first.
3. That in which one person can call a second with an annunciator while the second can also call the first; it being understood that in all cases telephonic conversation can be carried on after the parties are once connected.

The first case is the simplest, and the instruments and electric circuits are shown in circuit in Fig. 5; and more fully in Fig. 7, where *S* is an electric bell; *P* a button

telephone, and 1 and 2 wires leading from the main line to different individuals. This disposition would be desirable in our large flat apartment buildings, where the janitor could be called and talked with, while it would not be usual for the janitor to call the tenants of the house. Similarly it would be useful in all cases where an employer wishes to call and hold conversation with the employed.

The instrument located at the station of an employé consists of a telephone receiver, its socket and a switch, but no button. The switch is shown in Fig. 6, and it is used for the purpose of throwing the galvanic cell out of circuit and of allowing the telephone to remain in circuit.

The second case, illustrated in diagram in Fig. 8, relates to a system comprising an annunciator or signal adapted to indicate to the eye which sub-station is calling, "sub-station" meaning the office or apartment of any party desiring to call a second party, such as a servant or general messenger. The indicator may be of any suitable form, including in its circuit a switch such as was referred to in the first case, a bell to call attention to the annunciator, and the telephone. It may be noticed that in all our hotels and factories, the usual signal may be converted into a system, such as is described above, by introducing at the

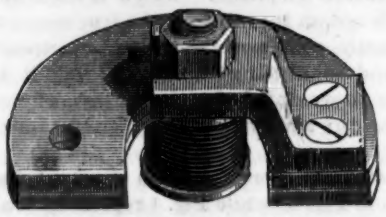


FIG. 4.—BUTTON TELEPHONE—COIL SUPPORT.

various rooms the button telephone, and at the main office the switch and telephones.

(TO BE CONTINUED.)

The Pan Electric Telephone in St. Louis.

The subjoined description comes from St. Louis of the Pan Electric system there introduced:

"A complete system has been invented and application for patent filed, under which the telephone cannot be used without dropping a nickel or one of the company's checks in the box, which nickel or check is held suspended until the connection desired is made; then, upon replacing the earphone, the nickel or check drops into an iron cash-box attached to the telephone. If the connection desired cannot be given, the operator at the central station returns the nickel or check by causing it to slide out upon a tray at the front of the box. Under this the company will derive its income from those who use the instrument, and in exact proportion to the service rendered, and not from the party in whose house the telephone happens to be located; and while our exchange is small, subscribers will only pay when they call up one of our number, and our income is assured at the start. This system seems to have solved the question, and is so popular that no difficulty is experienced in obtaining subscribers and placing telephones, the demand exceeding our present limit of capacity to supply.

"There is no confusion of voices or crossing of wires, all lines are separate and distinct from each other. The nickel operation is called the 'toll system,' and is an invention of Dr. Adams, of this city, and manager of the company. The operator at the central office has entire control of the nickel after it is placed in the box. When

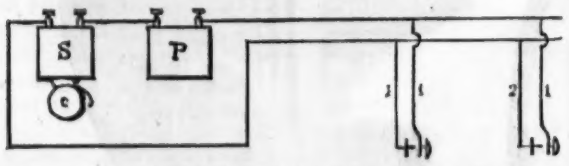


FIG. 5.—BUTTON TELEPHONE—DIAGRAM OF CIRCUIT.

the speaker is through he simply places the earphone on its hook and the connection is 'off' dispensing with the trouble of calling off and yelling yourself hoarse trying to get the central office to disconnect you. Every month the cash-boxes will be emptied and the contents turned over to the treasurer. The man collecting the boxes will be supplied with a key, by which he can remove the cash-box from the main box, but he will not have access to the cash therein.

"The system is a novel one and the managers predict the greatest success. Over 1200 applications are already in. The company will be able to furnish about 200 boxes per month."

Telephones-cum-Telegraphs.

BY A. M. ROSEBRUGH, M. D.

I have seen the communications of Mr. T. D. Lockwood and Mr. George Black on the use of the condenser in telephony, and I wish to join in acknowledging Mr. Black's priority, first, in speaking *through* a condenser, and second, in speaking over a telegraph line by means of a condenser. I made Mr. Black's acquaintance in the fall of 1877, and it was either that winter or the following spring that he made known to me his discovery. As I had been working in the same direction, we decided to unite our interests, and together filed an application for a patent June 4th, 1878.

Black's original idea was to use branch lines to ground through condenser and telephone, but we subsequently had the telephonic apparatus placed either in derived circuits of the main line or in branch lines connecting two parallel telegraph wires to form an artificial metallic circuit.

It is true that Elisha Gray's patent was issued simultaneously with ours, but his system is quite inoperative. He places the telephonic apparatus in the main line, and, in shunting the key and relay, he uses a resistance coil and condenser in multiple arc, the same as for the Harmonic telegraph. The result is that the key-shock in the telephone is just terrific.

Fears have been expressed that lightning might trouble a condenser circuit. We have not found that the case, but of late we have not used branch lines to ground, as we prefer derived lines or metallic circuits.

I might add that our anti-induction equipment not only renders telephones-cum-telegraphs practical, but actually improves the telegraphic working capacity of the lines.

TORONTO, Jan. 21, 1886.

Priority of Invention in Mechanical Telephones.

To the Editor of the Electrical World:

SIR: The article in your last issue (Jan. 16), by A. M. Rosebrugh, M. D., on mechanical telephones, not only interests me, but it amuses me exceedingly.

The modes and appliances, as illustrated in the article of Dec. 26 referred to, directly infringe upon several of my own devices as fully covered by my letters patent already granted, in several particulars, especially those of the most vital interest.

I have not yet been to London, but "London" has been to me, and parties fom there are now negotiating to secure the right to use my devices in that province, for "the purposes set forth."

The learned Doctor may have experimented some with

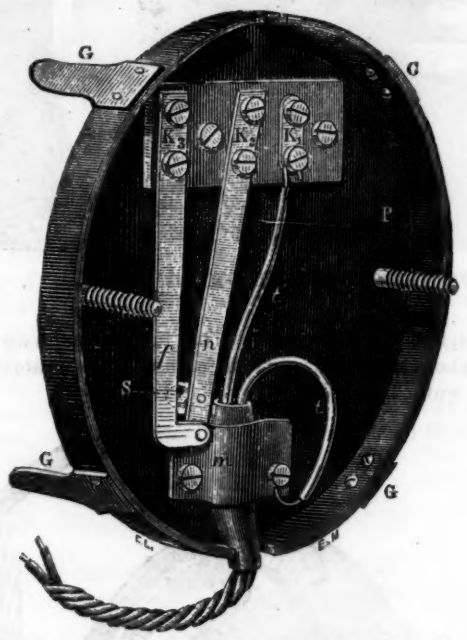


FIG. 6.—BUTTON TELEPHONE—DETAIL VIEW.

the "subject," but when he states the limit of the mechanical telephone to one-half mile and less, he certainly shows that his experience is very limited. I can cite to several lines over one-half mile long, with No. 20 copper wire, which have been in use for years and giving entire satisfaction. I will guarantee to put up a line with good sized double steel wire, one mile in length, which will transmit ordinary conversation (mechanically), and I know of no reason why it will not work several miles, in all kinds of weather; and I can operate the same *without any diaphragm*.

Perhaps our honored friend will claim to be the "father" of this also; however, it's a "sound child," and will ere long speak for itself throughout the whole land.

We shall all look with much interest for the promised "descriptive article on the subject at an early date."

WILLIAM HUBBARD.

ELGIN, Ill., Jan. 18, 1886.

The Eaton Telephone Receiver.

To the Editor of The Electrical World:

SIR: In an interview with Mr. E. N. Dickerson, published in the current number of THE ELECTRICAL WORLD, he is quoted as saying that the Bell form of receiving telephone is the best. This is very far from being a correct statement. I have in mind a case where a gentleman, who was using an Eaton receiver on a private line, was compelled by the local telephone company to hire Bell telephones. He paid the rental on the Bell instruments, laid them away in a safe place, and used the Eaton instruments as before; finding that, while the *legal* receiver had to be pushed into his ear, the *illegal* one could easily be heard at a distance of from one foot to two feet.

If the Bell Company and its licensees would use some one of the improvements on the Bell instrument, there would, perhaps, be less dissatisfaction at high charges.

ALEX. S. GIBSON.

NORWALK, Conn., Jan. 25, 1886.

One of the "Moves" of the Bell Company.

A remarkable discovery has been made by the Washington correspondent of one of our esteemed contemporaries. The communication below, dated Jan. 23, presents Prof. Bell in a new light as a diplomatic diner-out;

"Yes, Professor Bell dined last evening with the eminent electrician, Mr. Morton, at Hoboken," incautiously exclaimed an agent of the Bell Telephone Company to-day within hearing of the *Graphic's* correspondent. This suggestive admission was not designed to reach the writer's ears, for it furnishes the master-key to the strategy now being employed by the great monopoly to defend its patents against the government's proceeding for their revocation and annullment. The concern has heaps of money and will not hesitate to spend millions for the maintenance of its claims and franchises. They are playing for a colossal stake and they feel that they can well afford to risk a fraction of their vast profits in a bold effort to win. At present they are trying to retain as witnesses in their behalf every leading electrical expert who can be persuaded or blarneyed to indorse their claims. The number of such

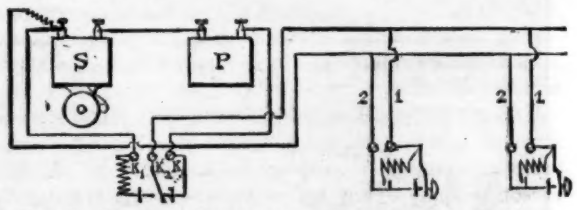


FIG. 7.—BUTTON TELEPHONE—DIAGRAM OF CIRCUIT.

distinguished authorities is not large, and of course their testimony will be a vital factor in determining the issue. Doubtless this explains Professor Bell's quiet visit to Hoboken for the purpose of scooping Mr. Morton into his net.

It is believed and is a matter of current gossip here that the Bell monopoly has also gone into the business of subsidizing newspapers and correspondents throughout the country on a liberal scale, so as to placate public opinion through that channel. Certainly the furious zeal displayed by certain journals in defense of the monopoly and in denunciation of the Interior Department lends probability to this theory."

Insurance of Electric Light Plants.

The following important communication has been addressed to the various local electric lighting companies and concerns by F. A. Gilbert, President, and J. English, Treasurer, New Haven Electric Co., Bridgeport Electric Co. and Newport Illuminating Co., in regard to the formation of a mutual fire insurance organization:

The position taken by the Board of Underwriters of the insurance companies, in advancing the rates of insurance upon electric light plants, on the ground of their being an extra hazardous risk, has induced us to investigate the question of mutual insurance. The experience of the mutual insurance companies insuring factory property of all

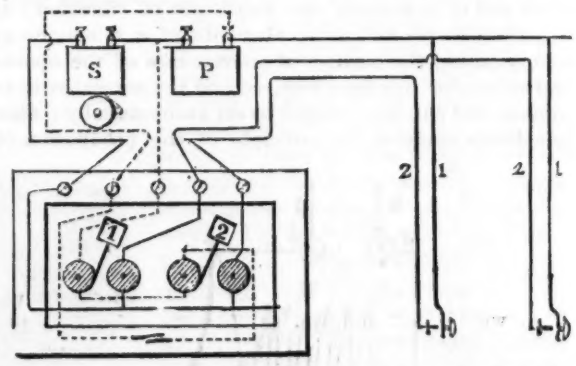


FIG. 8.—BUTTON TELEPHONE—DIAGRAM OF CIRCUIT.

kinds for the past fifty years has clearly shown that mutual companies can furnish insurance for less than one-quarter the cost of the business as done by the stock companies. We believe that a mutual insurance company can be formed by all the local electric lighting companies of the country in such a way as to insure the plants for less than one-quarter what it now costs the companies for insurance.

We have conferred with the managers of the largest mutual insurance companies of New England, and they concur with us in all we have said. To enable us to lay this matter before the convention in Baltimore, in February, in an intelligent manner, so that the necessary action may be taken to organize the Electric Light Mutual Insurance Company in proper form, we desire an immediate answer to the following questions:

1st. Would you be in favor of such an organization?

2d. Is the building your plant is in built of wood or brick?

3d. Is it more than one story in height, and if so, how is it occupied?

4th. What is the entire amount of insurance you are now carrying on your plant?

5th. Please state amount per year paid for such insurance?

6th. What would the loss be if totally destroyed by fire

7th. State your losses by fire in each year since plant was started.

We feel deeply interested in this question, believing it will be largely beneficial to all local electric-lighting companies, and hope that you will answer promptly and fully the above questions, addressing us at New Haven, Conn.

The Incandescent Lamp Tests.

We have received the following, in advance proof, from the Franklin Institute, being a letter addressed to one of our English contemporaries, the *Electrician*, by Mr. W. P. Tatham, President of the Franklin Institute:

My attention has been called to a letter of Messrs. Woodhouse & Rawson, of London, published in your impression of Dec. 11, and elsewhere, in which they repeat a calumnious statement of a New York paper of June 13, 1885, but omit to add the contradiction by the Secretary of the Franklin Institute, published in the following number of that paper, of June 20, as follows:

[*From the Electrical Review, June* 20, 1885.]

ED. ELECTRICAL REVIEW:

MY DEAR SIR: Do me the favor to correct, in your next, what I take to be an unintentional misstatement of my remarks regarding the "Electrical Tests," which appeared in last week's issue, and for which I must disclaim responsibility.

I stated to your representative, as I have invariably stated to numerous other inquirers, that I could give little or no information regarding them, and that the proper person to apply to for information was Mr. Tatham. Beyond this, I do not recognize the statements credited to me as my own. Yours truly,

WILLIAM H. WAHL,
Secretary Franklin Institute.

PHILADELPHIA, June 16, 1885.

No other notice, as far as I know, was taken of the article, and the story died of its own absurdity.

The reason given by Messrs. W. & R. for reviving this defunct slander is, that rival makers of incandescent lamps are prodding them with the report of the judges appointed by the Franklin Institute to test the efficiency and duration of incandescent lamps.

It is true that the Swan, the Maxim and other companies did not enter their lamps for the tests, for various reasons, but no one had any right or reason to apprehend that they would not be fair tests, and no one now has any reason to say they were not conducted fairly.

In the conduct of the tests, the cardinal principle was to do right, and also to avoid all appearance of wrong doing.

To this end, a code was adopted and judges selected, with the full concurrence of the contestants, and nothing was concealed from the parties in interest. The contestants were invited to inspect and did inspect every step in the progress of the tests. Their experts compared the photometric measuring powers of the judges with their own.

I believe it would be impossible to find four men better equipped and experienced for their duties morally, mentally and physically, than the four judges of these tests.

I was a daily witness of their work, and weekly progress reports of the tests were made to the Franklin Institute.

So much for the general indictment; and now for the particular complaint.

It is, *first*, that their lamps were tested without their knowledge or consent. *Second*, that their lamps were run at five volts above what they were labeled.

Two lots of their lamps were tested. The first lot, selected at random from a barrel of lamps belonging to the Van Depoele Company, were labeled 20 candles, 55 volts. They were tested and run at 55 volts. No. 9, with resistance cold of 106 ohms, lived longest, 715¼ hours. No. 2, resistance cold, 102 ohms, exhibited phenomenal brilliancy.

The complaint that this lot of lamps was entered without their knowledge or consent, may be well founded.

The second lot of lamps was received through the Edison Company. I now learn that the origin of this transaction was as follows:

At a meeting of the London Society of Arts, held Dec. 3, 1884, Mr. Wm. H. Preece, F. R. S., read a paper upon "Electric Illumination," in which appeared the following language [see *Journal of the Society of Arts*, Dec. 5, 1884, page 73]:

"The efficiency of the glow lamps has also been very considerably affected by the improvement made, for instance, by Messrs. Woodhouse & Rawson, and by Mr. Bernstein.

"The efficiency of the Edison lamps means the consumption of energy at the rate of five watts per candle, but lamps are now being made which give an efficiency of two and a half watts per candle with an equal life, which is equivalent to an immediate reduction of fifty per cent. in the amount of energy required to maintain the system alight, and therefore in the cost of production."

Whereupon the Edison Company challenged Mr. Preece to produce such lamps and have them tested by the Franklin Institute, whose committee were preparing for the tests which afterward were made.

Mr. Preece procured the lamps and forwarded them to the Edison Company, whose letter, dated April 13, 1885, to Professor Marks (who acted as an executive committee), says: "Mr. Preece, the electrician of the English Post-Office, has sent to Mr. Edison a number of Woodhouse & Rawson lamps. They are now in the New York Custom House. We have given directions to have them forwarded to you at the Electrical Exhibition in the original packing as soon as they are appraised."

At that time our test boxes were all occupied and our current employed.

Inside of the box, when received, was found a large label addressed "for Mr. Wm. H. Preece, 20 candles, 50 volts." The usual label of Woodhouse & Rawson was on every lamp, altered, however, so as to read as above, the figure 0 in the number 50 being written over an erasure. The resistances cold of all the lamps tested was nearly uniform, five at 100 ohms; two, each ninety-nine and 101 ohms, and one 102 ohms. [See Report, Table VI., page 38.]

These circumstances persuaded us that the lamps were not selected by chance.

They were tested and measured for horizontal and spherical efficiency upon the 7th May, both at fifty volts and at fifty-five volts with the results shown in the following table, which I have made up from the original records.

WOODHOUSE & RAWSON LAMPS. (Second lot.)

Measurements of Horizontal and Spherical Efficiency, at 50 *volts and at* 55 *volts, compared. Made May* 7, 1885.

Lamp No.	Volts.	Amperes.	Watts.	Candles averaged.		Watts per spherical candle.	Watts per horizontal candle.
				Horizontal	Spherical.		
30 ...	50	1.071	53.75	14.19	11.48	4.68	3.79
	55	1.167	64.18	22.73	18.52	3.46	2.82
31 ...	50	1.084	54.20	12.38	9.93	5.46	4.38
	55.05	1.182	65.07	20.93	17.28	3.76	3.11
32 ...	50.03	1.084	54.23	12.43	10.47	5.18	4.36
	55	1.195	65.72	21.28	17.36	3.78	3.09
33 ...	50	1.089	54.45	14.07	11.75	4.63	3.87
	55.05	1.188	65.40	22.67	19.01	3.44	2.88
34 ...	50.03	1.050	52.53	12.52	10.34	5.08	4.20
	55	1.147	63.08	20.78	16.91	3.73	3.04
35 ...	49.95	1.046	52.25	14.48	11.73	4.45	3.61
	54.95	1.139	62.58	23.53	19.56	3.20	2.66
36 ...	49.95	1.088	54.35	15.68	13.05	4.16	3.47
	55	1.191	65.50	25.98	21.41	3.05	2.52
37 ...	50	1.086	54.33	13.68	11.51	4.72	3.91
	55	1.185	65.17	22.93	18.74	3.47	2.84
38 ...	50.05	1.097	54.90	12.24	10.05	5.46	4.49
	55	1.197	65.77	20.70	17.84	3.69	3.18
39 ...	50	1.089	54.45	11.88	9.73	5.59	4.58
	55	1.186	65.23	19.74	16.33	3.99	3.41
Aver'ge	50	1.0784	53.944	13.375	11.004	4.941	4.066
Aver'ge	55	1.1777	64.770	22.127	18.296	3.557	2.955

Upon discussing these preliminary results, the judges found it impossible to follow the label. Twenty candles illumination could not be had with fifty volts, and they decided to raise the electromotive force for the following reasons: There are three points of excellence in incandescent lamps—brilliancy, duration and economy. The boast for these lamps is that they are brilliant and cheap. It would not benefit their reputation to test them with fifty volts, at which the preliminary tests show that they are both dim and dear, for the sake of increasing their duration, of which the remaining time of the tests, about 300 hours, would furnish no proof.

In this decision the judges were governed by a desire to do for the lamps what they thought the makers would do if they had been present and aware of all the facts. The judges made no concealments of what they did, nor of their reasons for it. They published the results of the tests with fifty volts, but not prominently.

It was out of kind consideration for the makers of the lamps that the judges raised the electromotive force, and it was out of a like consideration that they did not publish a table like the above.

These considerations Messrs. Woodhouse & Rawson have trampled under their feet, and have turned again to rend the committee.

I am unable to see the least shadow of unfairness in the proceedings of the judges, and I ask all those journals which have published the letter of Messrs. Woodhouse & Rawson to publish this reply.

The Franklin Institute Tests.

To the Editor of The Electrical World:

SIR: In a letter published in THE ELECTRICAL WORLD of Dec. 19, 1885, Mr. Charles F. Heinrichs criticises the recent report of the special committee of the Franklin Institute on competitive tests of dynamo electric machines, and condemns the results of their work on the ground that their power measurements are wholly unreliable. Advance proofs of this article were forwarded to the London *Electrical Review*, and later on, a copy was sent to the President and Board of Managers of the Franklin Institute, accompanied by a letter from Mr. Heinrichs, in which he modestly requested that body to reconsider the tests, as, if the results were allowed to stand, they might prejudice prospective investors in embryo electric light systems. The London *Electrical Review* published the article on Jan. 1, and the editor, in commenting upon it, remarked that it would be well to make allowance for the fact that its author is himself the inventor of a rival machine. What the Board of Managers will do in the matter remains to be seen, but it is not likely that they will lend themselves to an advertising dodge of this sort, for that it is one is evident from the fact that so much of the article refers to the Heinrichs dynamo that its ostensible purpose is lost sight of occasionally.

Having been present at the Philadelphia tests as the representative of the United States Electric Lighting Co., I feel justified in expressing my opinion that the committee's work is of great value, and to help convince the Board of Managers that they really should not let their sympathy for embryo lighting systems lead them to yield at once to Mr. Heinrichs' demand, I will endeavor to point out a few facts relating to the matter that have escaped his attention.

To support his position, Mr. Heinrichs refers to some tests of his own dynamo, made by a London firm of electrical engineers, whom he engaged for the purpose. These gentlemen reported that Mr. Heinrichs' dynamo—I believe that he has made only one as yet, owing to unfortunate prejudices of investors—having a capacity of about 6 h. p., converted 91 per cent. of the power absorbed into electricity, and that when working under best conditions 76 per cent. of this power appeared in the external circuit. Believing these tests to be correct, and knowing from theoretical considerations that his dynamo is the best in the world, it was evident at once to Mr. Heinrichs that the high commercial efficiencies of the Edison and Weston dynamos obtained by the Franklin Institute Committee must be wrong. It was only necessary for him to locate the error in order to demolish the record. A careful scrutiny of the electrical work discovered no weak spot, and the power measurements were consistent throughout, and agreed with the electrical measurements. But when he came to the item of armature friction, he found that the Institute committee had obtained much lower results than Messrs. Alabaster, Gatehouse & Co. (the electrical engineers referred to above) had found for his dynamo. This, he concludes, explains the erroneously high efficiencies attributed to the Edison and Weston machines. To corroborate the friction measurements of Messrs. A., G. & Co., he refers to the report of the Crystal Palace Exhibition Committee's tests of old style Edison "Z" and Weston series arc machines, and in order to show that these measurements agree substantially, he resorts to a mathematical formula, in which he assumes a numerical value for the coefficient of friction, without even stating to what elements the coefficient refers.

Allowing that the whole of the Philadelphia power measurements are about 1 h. p. too small—which is what Mr. Heinrichs pretends to show—the result would be only a general lowering of the efficiencies about 3½ per cent., while the ratio between the electrical and commercial efficiencies would remain unchanged. Now the Franklin Institute Committee found the electrical efficiency of the Edison and Weston machines to be about 96 per cent., while the electrical efficiency of the Heinrichs dynamo is 91 per cent., according to the report of Messrs. A., G. & Co. Taking into consideration the different power conversion factors of the machines, this is a fair showing for the Heinrichs dynamo. To account for the difference in the commercial efficiencies of the above machines it is only necessary to glance at the following table, which gives the ratio of the internal resistances of the different dynamos when working under the best conditions, to the resistance of the external circuits, it being understood of course, that the total electrical energy is divided between the machine and the external circuit in direct proportion to their respective resistances:

MACHINE.	Tested by	P'w'r capacity.	Resistance (hot).		Portion of power absorbed appearing in dynamo.		
			Dynamo	Ext'l cir't.	Arm'tre	Field	Total
		H. P.	ohms	ohms	P. c.	P. c.	P. c.
Edison No. 10 (shunt).....	Franklin Inst., '85 committee.	36	.0251	.6238	3.3	1.78	5.08
Weston 6 W. I. (shunt).....	" "	20	.0438	1.206	3.45	1.89	5.34
Edison "Z" (shunt).....	Crystal Pal. '82 committee.	13	.204	2.58	7.4	3.686	11.086
Weston arc (series).....	" "	13	2.44	14.67			16.6
Heinrichs arc (series).....	A., G. & Co., '84.	6	1.73	8.17			17.5
			From test No. 4				

It will thus be seen from the above table, that that portion of the total electrical energy developed by the various dynamos referred to by Mr. Heinrichs, which is spent in overcoming their own resistance, varies from 5.08 per cent. and 5.34 per cent. in the Edison and Weston Philadelphia machines respectively, to 17.5 per cent. in the Heinrichs dynamo. This not only accounts for the difference in the commercial efficiencies of the above machines, but at the same time indicates that one line of progress in dynamo-machines has been in the direction of powerful and economical fields and low internal resistance. If I was not simply defending the Franklin Institute Committee from a most unreasonable attack, I would point out, among other things, that this is one of the facts which does not appear to have been grasped by Mr. Heinrichs. His ignorance is further displayed in his statement that a shunt winding would increase the commercial efficiency of his dynamo. On the contrary, other things equal, and the dimensions of the field magnets being fixed, a shunt winding would require the same expenditure of electrical energy as a series winding, in order to produce a given magnetic intensity; but as the latter winding would have the additional advantage of a greater proportion of copper to the

amount of insulating material required, and as the copper would therefore be closer to the cores of the magnets, the series winding would actually be the most economical. Again, in the case of a constant potential machine, the energy expended in the field is about the same under all loads, whereas it varies somewhat proportionately to the load in a series machine, making the latter the more economical under partial loads.

It will be observed that I have not attempted to criticise the results of either the Crystal Palace Committee's tests or those made by Messrs. Alabaster, Gatehouse & Co. The former, we know, were conducted with great care, though Professor Adams does not mention in his report that the power measurements were checked by an absorption dynamometer, as Mr. Heinrichs avers. A transmission dynamometer was used by the Crystal Palace Committee, and as Mr. Heinrichs asserts that all transmission dynamometers are unreliable, it is rather inconsistent for him to refer with such confidence to their power measurements.

Professor Adams is evidently not acquainted with Mr. Heinrichs' friction formula, for he states in his report that the power for the Crystal Palace tests was supplied by an engine capable of giving 40 to 43 horse-power in the cylinder, and that it did not use during the experiments more than 1½ to 3 horse-power in friction. He found, however, that a 14 horse-power Gramme dynamo absorbed 2.348 horse-power in friction. I am inclined to think that the journal boxes of that dynamo were not very carefully adjusted.

Without, however, questioning the accuracy of the Crystal Palace committee's friction measurements, it is safe to say that it does not follow from them that some 50,000 ft. lbs. of energy per minute must be, necessarily, expended in heating the journals and boxes of medium-sized dynamos when running at ordinary speeds, and I may add that other friction measurements of similar machines, made with Brackett dynamometers, agree substantially with the results obtained by the Franklin Institute committee.

Messrs. Alabaster, Gatehouse & Co. conducted their electrical tests of the Heinrichs dynamo with very crude apparatus, using an Ayrton & Perry permanent magnet voltmeter for example, for their potential measurements. They did not deem it necessary to state in their report how their instruments were calibrated. Their power measurements were made with a Prony brake, a Morin transmission dynamometer having failed to give satisfactory results in their hands. The latter apparatus was used, however, as an indicator. Reasons for placing more confidence in these tests than in those made by the Franklin Institute committee are not evident. It may be interesting to recall the fact that at the Philadelphia Electrical Exhibition Mr. Alabaster, of the above firm, stated that in his opinion the Ball Unipolar machine was the best dynamo ever made.

The report of the Institute Committee calls attention to the fact that the machines were favored as regards friction by being coupled direct to the dynamometer, belt strain being thus eliminated. Besides, the brushes were removed during this test. Mr. Heinrichs does not note this point, nor does he take into account that the form of armature used in his machine presents much greater resistance to the air than the compact drum armatures of the Weston and Edison machines.

As to the delicacy of the dynamometer used by the Institute Committee, I would say, from personal knowledge, that during the friction measurements its balance was disturbed by a slight pressure of the hand on the dynamo, and on one occasion, while measuring about 20 horse-power, the additional power absorbed by a single Weston 125 candle-power lamp was quite accurately measured.

In his letter to the President of the Franklin Institute Mr. Heinrichs calculates what he calls the probable value of the friction element in several of the machines tested by the Institute Committee, and then, assuming that the other power measurements are correct, he deducts this value from the total power figures as they stand, and pretends to prove thereby that the electrical efficiency of the machines, according to the committee's measurements, is above 100 per cent. This is sheer silliness, of which a school boy would not be guilty.

GEO. B. PRESCOTT, JR.

WESTON LABORATORY, NEWARK, N. J., Jan. 21, 1886.

Competitive Tests of the Edison and Weston Dynamo Electric Machines.

In reply to Mr. Charles F. Heinrichs' criticism of the late dynamo tests at Philadelphia, the Franklin Institute has addressed the following open letter to that gentleman

FRANKLIN INSTITUTE,
PHILADELPHIA, Pa., Jan. 20, 1886.

Mr. Chas. F. Heinrichs, New York:

DEAR SIR.—The President of the Franklin Institute hands me your letter of the 4th inst. for reply. A careful reading of its contents satisfies me that you have not grasped the method of coupling the dynamo to the dynamometer. No belt was used. Fig. 7 of the report will make clear at a glance that the end of the dynamo shaft was coupled to the end of the dynamometer shaft.

The tests were competitive, and it was very necessary to eliminate the accidental variations of friction due to errors in stretching belts, in order to judge fairly of so evenly matched and highly-finished machines.

There was no friction at all due to pull of belt in any case, and the brushes were always raised.

Whenever the friction of the journals was measured, it was after the machine had been running many hours.

There would be little difficulty in satisfying yourself by actual experiment upon Weston or Edison machines under similar circumstances to those of the test that the friction of the armature bearings is marvelously small.

It would be much better to do so than to take figures from antiquated machines.

Should you for reasons of your own desire to make out a less efficiency than that shown in the test, you should add to the power applied sufficient power to meet your views as what *might* be required by the friction due to the pull of the belt on the armature shaft, and by the bending of the belt and for the brush friction, and then this sum should be used to divide the energy of the external circuit. The phrase "Power applied" of the report included the friction of the shaft of the armature. Thus if you insist that the armature friction is 1.337 h. p., you could say for Weston No. 7 M dynamo $\frac{26.34}{29.29 + 1.337}$ = commercial efficiency, or $\frac{28.47}{29.29 + 1.337}$ = total efficiency of electrical conversion.

A careful reading of the report, which you criticise with so much apparent confidence of a thorough knowledge of its contents, would have revealed the following paragraph on page 42: "The friction of the armature and of the dynamometer were obtained and *the latter* subtracted from the power applied to each test."

The committee spent much labor upon the calibration of the Tatham dynamometer, and have every confidence in its results, and believe its error from any cause to be inappreciable, as compared with others.

In deference to the request of the President and Managers of the Franklin Institute I make reply to your letter, but do not desire to attempt further discussion, when agreement as to premises cannot be reached.

I am, faithfully yours, WM. D. MARKS.

Where Telegrams are Rare.

A very nice young man spent most of the hot days of last August at a wind-swept retreat in the Atlantic Highlands of New Jersey. Atlantic Highlands, after the summer has gone away, is a tired little village of 500 souls. Nobody ever comes there, and nobody ever goes away, during the winter months. The village goes to sleep as soon as the leaves begin to turn, and hibernates until the sea at the foot of its cliffs becomes warm enough to bathe in. Then the summer loiterers pour in again, and buckboards and village carts enliven the place with a kind of Coney Island jollity.

This nice young man, when he was there last summer, met one of the rustic beauties of the place. He came back to his work in the city, but the witchery of her brown eyes came with him. He wrote, and she asked him to call during the winter. So recently he sent a telegram, telling her that he would call during the day.

It was the telegram that caused the trouble. The village was unaccustomed to telegrams. It startled the community. It was too much for the nerves of that quiet place. Somehow—nobody ever will know just how—fifteen minutes after the message clicked into the office every person in town knew that young Blake was coming to see Miss Trevette. Every young lady of the town made up her mind to catch a glimpse of this rash young man who sent telegrams, and every man determined to be there to see that everything went smoothly.

Now, this nice young man was a modest young man. It was with some misgiving that he drove over the hills to the Highlands. And when he did get there he determined to sneak quietly to the home of his friend. That was his programme. He knew there were only 500 people in the village, and he thought no one would know except the girl with the brown eyes.

The carriage drew up in the main street of Highlands. The nice young man got out in the middle of a great crowd. There were 499 villagers gathered to receive him. She was the only one that remained at home. The entire village looked on while he paid the driver $3 for the trip from Red Bank. Then he asked the way to her house, and marched up to the home of the brown-eyed beauty at the head of a procession of 499 interested individuals, determined to have fun at any cost. She saw the procession coming up the hill, and sent word that she was not at home. So, like the king of France, he marched down the hill again. He will not go to Highlands next summer.

NEW YORK NOTES.

OFFICE OF THE ELECTRICAL WORLD,
Jan. 25, 1886.

The Gas Commission of this city is composed of the Mayor, the President of the Board of Aldermen and the Commissioner of Public Works, and they have full charge of making contracts for the lighting of the city. An application was filed with them on Jan. 23 by the Ball Electric Illuminating Company for a contract for the lighting of several portions of the city up-town. They claim to be able to do the work better than it is at present done, and that it will not cost the city one half of the present figures. The Gas Commission will consider the application at its next meeting. The company is a stock one, with a capital of $100,000, and its President is William T. Kitsell, proprietor of the Hotel Madison. Mr. Crane, the electrotyper, of No. 21 College place, is Secretary, and Edward Purvis, Treasurer.

At a meeting of the stockholders of the Edison Electric Illuminating Company on the 19th inst., it was voted to increase the capital stock from $1,000,000 to $2,500,000. A part of this will be issued to the Edison Electric Light Company, and the remainder will be open for subscription by stockholders. F. S. Hastings was added to the board of trustees.

Notice has been issued to the stockholders of the Electric Tube Company that a meeting of the stockholders of the company will be held at the office of the company, No. 18 to 24 Bridge street, Brooklyn, Jan. 30, at 2 o'clock P. M., for the purpose of considering an agreement made by the trustees of the company with the trustees of the Edison Machine Works and the trustees of the Edison Shafting Manufacturing Company, to consolidate the company with the said Edison Machine Works and the said Edison Shafting Manufacturing Company, and for the purpose of considering the advisability of such consolidation and of taking necessary proceedings to effect the same.

The Consolidated Telephone Company, of Jersey City, controlling the Shaver mechanical telephone system, have removed their headquarters to this city. They have leased the commodious lofts at the corner of Cortlandt and Greenwich streets, and hope there to find sufficient room for their business, which had outgrown the old factory. The offices, factory and central telephone exchange will now be located together in the same building. The company are several days behind their orders, and all who want supplies should make their wishes known a few days in advance of the time when the goods will be needed. The Goodyear Rubber Company are among the latest installers of the Shaver system, having fitted up their works at Naugatuck, Conn., with 10 or 12 telephones.

The WORLD has on more than one occasion pointed out the demand that exists for electric lighting on the small scale. A really notable boom is offered now in the Shipman engine for plants of one or two arc lights or fifteen or twenty incandescents. Messrs. Hawthorn & Frisbie, 40 Cortlandt street, the agents, are now running 15 lamps of 16 candle-power each from one of their 2 horse-power Shipman engines, and they claim that they will run 20 of these lights by enlarging the pulley on the engine and running the Jackson dynamo 2,000 revolutions instead of 1,500 as at present. Parties desiring small power should call and see the engine at work at the address given above. Absolutely steady motion is guaranteed.

A new enterprise has been started here by Mr. C. M. Ohrnell, who is agent for the Westerlandt patent diamond carbons. His office is in Room 57 Tribune building.

J. H. Bunnell & Co. showed me last week a new style of Fuller battery that ought to have a large sale. It is made in two sizes of open battery jars. Four iron arms rest on the edges of the jar, holding in the centre a porous cup outside and around which are suspended four carbons. A large zinc is suspended inside the porous cup, which also contains mercury to keep the zinc amalgamated. A patented solution is used. This battery is suitable for both open and closed circuit work, and will give an electromotive force of 2 volts with a resistance of three-tenths ohm.

Mr. J. S. Hall, of 40 Cortlandt street, has been experimenting for a number of years in oil cups for all kinds of machinery, and especially for dynamos. He now has an excellent line of these goods, and thinks there is still room for addition and improvement. Any electrician wanting an article of this kind is sure to suit himself here.

Robertson & Wiswold, 16 Broad street, this city, are pushing a new system of electric light, based on the use of Mr. Roberts' closed circuit batteries. They have a number of these batteries now set up, and connected with arc and incandescent lamps, a motor running fan, etc.

The Excelsior Apparatus Company, 30 Maiden Lane, have a few more of their specially made dynamos for experimenters, schools, colleges and places where a small light is required. A description of the dynamo appeared in the advertisement of the company, Dec. 12 last.

Electric lighting has made heavy drafts on the resources of a great many different industries, among which may be mentioned that of making glass globes. A large number of new sizes, shapes and even colors have been devised for the purpose. The New England Glass Works, which are prominent in this field, are represented at 29 Murray street, by Mr. J. R. Kendall, a gentleman well known in this city and throughout the country among the glass trade.

Last week, business was reported as on the whole rather dull and inactive in the New York district. No heavy sales occurred, but a good disposition was shown, and large orders are shortly to come.

The Brooklyn Municipal Electric Lighting Company (Thomson-Houston system) are erecting a new station on De Kalb avenue, corner of Hudson avenue. Judging from what I see and hear, it will be one of the most complete stations in the country. The company are now furnishing between 400 and 500 arc lights to the city and to private consumers.

Tucker & Baxter, 40 Fulton street, Brooklyn, have opened their new salesrooms on the main floor of the building they leased recently. They are there exhibiting all lines of electrical supplies. A leading specialty of theirs is the automatic temperature regulator. Their combined electric call and inkstand is a most useful and ingenious article. A pyramid in the centre on a black base contains a small battery, and under the base is a small bell. An ingenious little head set in front of the base, will, when pressed down, ring the bell. W. T. H.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, Jan. 25, 1886.

It has proven a great disappointment to the promoters as well as the friends of the Edison enterprise here, that the location for the central station incandescent plant of the company has not yet been decided upon. The entire equipment of the station, including the engines, boilers and dynamos, is now stored in the city, awaiting installation, which will be done just as soon as the building is selected and in readiness. It is predicted that by the first week in March the plant will be ready to start up.

A telephone has been placed on board the steamer "Monohansett." The wire is along the wharf at New Bedford, Mass., and connected with an instrument in the office. As the steamer leaves her wharf the wire is automatically de

tached. This is said to be the first telephone ever put into a steamboat.

The annual meeting of the stockholders of the Sun Electric Light Company, of Woburn, Mass., was held on Tuesday, the 12th inst. The directors submitted a report of the financial position and progress of the company, which was approved. The business transacted was for the most part formal, and concluded with a vote of thanks to the board of directors, all of whom were unanimously re-elected. This comparatively young company appears to be developing rapidly. Its incandescent lamps are well and favorably known in the market, and operations are now being extended in the field of long-distance supply by means of high tension currents. A multiple-series system is employed, with special apparatus by which every lamp group is protected, and the current of a defective lamp provided for without interference with the others, so that lamps may be turned on or off precisely as in a simple multiple-arc system. At an early date I expect to be able to send you further details of the series and multiple-series systems of this company, which, as explained to me, certainly accomplish what has not hitherto been done, or at any rate not with great success.

The Boston Commercial Bulletin issue of Jan. 23, in an article drawing attention to the enhanced prospects of the Erie Telegraph & Telephone Company, very correctly states: The Erie, for instance, pays the American Bell Company $120,000 per annum royalties, which is equivalent to just 2½ per cent. upon Erie's 48,000 shares of stock. The Erie Company would be glad to have that money to increase its dividends, and would be perfectly able to meet competition of proposed rivals without any protection of a patent behind it.

The S. C. Forsaith Machine Company, of Manchester, N. H., has recently put upon the market a simple yet reliable and effective dynamo.

The company is very modest in its claims for this handsome and durable machine, on which it has been busily engaged for some months. The promoters are now satisfied with the results of their labors, and are prepared to negotiate for the equipping of electric light plants in any section of the country. Already the company is at work installing an arc light and also an incandescent plant at Concord, N. H. Mr. Edwin R. Whitney, of Manchester, N. H., the manager of the above company, is the inventor of this dynamo (patent No. 322,230), mention of which was made in the patent record of THE ELECTRICAL WORLD, July 25, 1885.

W. I. B.

PHILADELPHIA NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
PHILADELPHIA, Jan. 23, 1886.

The Electric Mail Box Company has been incorporated under the laws of New Jersey. It manufactures a very desirable box, and is doing quite a successful business. Mr. F. E. Smith, formerly with the Clay telephone, is superintendent, with an office at 723 Arch street, this city.

We are glad to hear that Mr. Trump, the General Manager of the Novelty Electric Company, who has been confined to his home for some time by illness, is recovering, and will soon be able to resume charge of the business.

The Thomson-Houston Electric Light Company, of this city, have just issued a very fine descriptive catalogue, which is full of useful information, and which they would be pleased to mail to all interested.

The Brooks Underground Company have reorganized, and Mr. A. F. Moore has been elected Vice-President and General Manager. The offices of the company have been removed to 200 North Third street. They are now very busily engaged in working two miles of underground cables for the Brooklyn telephone exchange. The cables made and laid in New York by this company, over a year ago, are working very successfully.

The armoring of the long submarine cable for the Bell Telephone Company is being done by the Clark Insulated Wire Company. Mr. J. Chester Wilson, the General Manager of this company, reports business as improving.

Philadelphia will be well represented at the coming National Electric Light Association, to be held in Baltimore, and as this city has been rather a fertile field in producing new ideas in electric light matters, some good suggestions can be expected from its representatives.

The Main Belting Company have had, during the past year, very gratifying results with their belts. They were awarded a medal at New Orleans.

Since Secretary Lamar has decided that the Bell patents are contestable and should be brought into the courts, and it becomes apparent to far-seeing people that, in the ordinary course of affairs, the case cannot reach the United States Supreme Court for at least two years, certain parties here are becoming active in reviving some of the old opposition telephone schemes which were squelched recently by the United States District Courts. As the Bell patent has only seven years to run, expiring in 1893, these people hope to worry through that length of time, and then be ready for a strong legitimate opposition. The determination of the Gray people in Chicago to go ahead with a capital of $10,000,000, and the news from St. Louis that the Pan Electric Telephone Company has already opened an exchange and commenced a "thriving" business there, have greatly stimulated the anti-monopoly people here. They do not appear to comprehend the fact that by 1893 the Bell people may still hold many controlling patents, but as they seem willing to test the matter again, the public will, doubtless, give a liberal patronage to anything in the way of opposition.

The report printed in last week's ELECTRICAL WORLD to the effect that the Standard Oil Company had, through its agents, bought the underground conduits under Chestnut street, with a view to inaugurating a vast underground system for supplying telegraphic and telephonic service, light, power and heat (the latter gas), has been denied; but the *North American*, of this city, reiterates the story and vouches for its truth. The fact is that the Chestnut street conduit was bought by William G. Warden, of the firm of Warden, Frew & Co., who are the agents of the Standard Oil Company in this city. The latter company argues that it does not follow that because their agent makes a private purchase it is for them, but none of the other parties interested will talk. The *North American* maintains that they went about the negotiations in a business style that showed a large and carefully-digested plan. They bought in all the stock in the old companies and cleaned everything out of the way for a fresh, bona-fide beginning. It is said they are prepared now to put ten millions of dollars in the scheme, and of course increase it as the demand for lighting increases. Five millions, it is roughly estimated by one familiar with the subject, would put down conduits everywhere in the city where gas mains are now, and $5,000,000 more would make all necessary connections. The same authority has it that on such a large scale electric light can be furnished to private dwellings at relatively the same price as gas. The reason that thus far the thing hasn't paid is that the lights were so far apart. More electricity was lost than used. The investment of ten millions, it is declared, will pay ten per cent., or a million a year.

These assertions and mysterious denials are at least amusing, but what follows will better illustrate the saying that words were made to conceal thoughts. The Clerk of Select Councils was instructed to send a circular to all the telephone, telegraph, electric light, and other companies controlling overhead wires in the city, inquiring as to what they proposed doing toward complying with the ordinance of Councils requiring the removal of poles and wires from the streets of the city.

The answers came, parrot-like and with one accord, that they were all anxious to get under ground.

General Manager Charles S. Pugh, of the Pennsylvania Railroad Company, writes: "Our wires leading into the city from the various lines do not occupy the streets to any considerable extent, since the poles are placed on private property to West Philadelphia and by cable over our elevated railroad to Broad street, from which point a limited number diverge to other portions of the city. Our interests in this question are so insignificant, compared with those of large telegraph companies, that we have thought it wise to wait a solution of the matter by them, satisfactory to yourself, to which we would conform."

"As we have no poles of our own in this city," writes the General Manager of the Thomson-Houston Electric Light Company, "we have none therefore to remove. The wires we are running on the poles of the city are those belonging to the Reading Railroad Company, and we shall be glad to remove them as soon as we have a practical means of placing the same under ground."

General Manager Charles E. Morgan, of the United States Electric Light Company of Pennsylvania, states that the officials of the Company have given "earnest thought and attention to see if any of the inventions for electric underground purposes are successful, but so far have failed to find any that answer our purpose. We are still looking and investigating, with the hope that something may be found to relieve us from our embarrassment in the matter."

President Bentley, of the Bell Telephone Company, said his company desired to lay wires under ground, and proposed to spend $25,000 to $35,000 this season to do so.

William W. Ker, attorney for the Clay Commercial Telephone Company, wrote a lengthy letter, explaining that in June, 1885, the company was enjoined from doing business by the United States Circuit Court. An expert reported that nearly all the wires of the company had been stolen. When the court removed the injunction and the company resumed business, they would try to comply with the ordinance.

The Western Union has already defined its position.

It will be noticed that of the five companies sending replies, only three have any poles or wires to speak of. Of these, one is anxious to commence work; another doesn't know how to begin, and a third has interests of that kind so insignificant that it can afford to await the experiments of some one else. The fourth company says bluntly: "We have no poles of our own in this city," and the fifth cannot bury its wires because they have all been "stolen." Now, when we consider these replies, and judge them in connection with the legal objections raised by President Green, of the Western Union, we can feel some sympathy with the municipal officer charged with abolishing all overhead wires, and who "has them on the list." It must not be forgotten that the city itself has been frank, and has confessed that it cannot bury its own wires.

Messrs. Henry Clay and George W. Bratton's pneumatic tube enterprise, with the question of its authorization by Councils, came up last week before the Electrical Committee of Councils. The area for which it is proposed to provide this service extends from river to river and from Columbia to Washington avenues. Mr. Bratton was present and stated that the system was the same that had been in operation in London for years. Messages could be sent from place to place for five cents through one or the other of two tubes, which would communicate all along the routes with the dwellings or stores of subscribers, and transmit messages without error or delay. The matter was referred to a sub-committee for examination of the working models.

At Harrisburg an application for a charter has been made at the State Department for the Electric Reporting Company, of Pennsylvania, with a capital of $5,000. This company, which will have its principal office in Philadelphia, is formed for the purpose of giving financial and general news and stock quotations by telegram in Philadelphia, Pittsburgh, Oil City and Bradford. It will also maintain, lease and operate telegraph lines. The incorporators are George N. Wakefield, William H. Smith, Jr., Charles H. Lang, Charles J. Lauderbach and Thomas R. Heller, all of Philadelphia.

In the latter part of November last, Charles Strohecker, a very estimable gentleman, an expert operator and stenographer for Superintendent Gill, of the Western Union, suddenly disappeared. He left behind him a wife and two children and nearly a whole month's salary. When last seen he was leaving the office to walk home. Nothing was heard of him until last Friday, when a message from Belvidere, N. J., announced the arrest of an insane tramp, who gave his name as "Charley," and his residence as Philadelphia, and who was continually writing shorthand. His mind seemed entirely gone, but a series of raps of five each (calling "P.") would make him respond "I. I." Where the poor fellow could have wandered during two of the dreariest and coldest months in winter no one can imagine. The pity is that so sad a fate should befall such a sober, talented and amiable young man.

E. F. I.

WESTERN NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
CHICAGO, Jan. 23, 1886.

If we may judge from the daily papers, quite a number of opposition telephone companies are springing up in various parts of the West, as a direct result of the government's decision to go into the matter of the validity of the Bell patent. The decision was not a surprise to any one out this way, as pains seem to have been taken to give out hints previous to the decision indicating what the decision would be.

It is said that building operations on the North American Telegraph line will be inaugurated immediately, and that the line will be in working shape by May 1.

The difficulty which the United States Electric Lighting Company is having with Cook County in regard to the $80,000 electric light plant, which the company recently furnished the county, is well explained by the following report. It will be seen that it is a question of an overworked plant, and that the United States Company has furnished all that its contract called for. It is hinted that the gas people have had something to do with some of the complaints made against the plant:

The special committee of the County Board appointed to decide about the acceptance of the electric light appliances and apparatus recently furnished to the county institutions by the United States Electric Light Company of New York, and to consider the appointment of suitable persons to control the electric light machinery and plant at the several county institutions met recently. C. C. Warren, the representative of the company, stated that the work was practically completed last November. He had found great difficulty in getting the County Commissioners to inspect the work, and several months had elapsed, putting his company to an expense of $50 or $60 a day since that period, to have the commissioners testify as to whether the work was properly done or not. A payment of $16,000 was due Jan. 1 last under the contract, with monthly installments of about $2,000, making the entire sum of $80,000 payable within thirty months. Commissioner Wren said the light was not nearly so good as the gas light formerly in use in the building, which the county offices could not yet safely dispense with. He was opposed to the payment of anything to the company until the work was made more complete and the light made as effective at least as the gas light it was designed to supersede. Parties had agreed to furnish two of the county buildings with electric light apparatus for $19,000. The reason for the obscurity of the light, Mr. Warren maintained, was owing to the fact that the dynamo machines were only designed to supply 1,000 lights, whereas there were 1,200 burners in the County Building.

Commissioner Wren said in view of the unsatisfactory character of the light, which he felt sure was very far short of 16 candle-light power, and the general incompleteness of the work done by the United States Electric Light Company, he was opposed to the payment of the amount claimed by the company until they had made good their contract. The matter was accordingly postponed until Feb. 1 next.

The examination of applicants to run the electrical machinery and appliances in the several county institutions was then proceeded with, the results being noted for further action by the committee. Warden McGarigle, of the County Hospital, said they had 1,525 lights in that building, but the engines were only calculated to run 800 burners at a time.

Ed. McDonald, the engineer of the County Hospital, thought the duties of the electrician and engineer should not be combined, as the knowledge and experience required to safely run a boiler and engine were widely apart from the studies pursued by one skilled in the use of the electric light.

Commissioner Klehm said he had always been opposed to the introduction of the electric light into the county institutions, and was now. He thought it altogether unnecessary and involving an unwise outlay, but as the County Board had entered into a contract with the United States Electric Light Company they would have to live up to it.

Commissioner Fortune said the sum and substance of the universal complaints were that the burners did not give sufficient light in the county offices, and they had to burn nearly as much gas as before they were introduced.

Mr. Warren said it would be the most economical policy for the County Board to appoint an expert electrician to have charge of the several engineers and electrical operatives at the different county institutions, and added that the lighting capacity of the electrical plant could readily be increased by the augmentation of power when needed in the boilers and engines in use in the institutions where all the burners mounted by the company were needed to be in operation at the same time. It was understood by his company that only a certain number of the burners were to be in use at any one time. They did not, he replied, in answer to Commissioner Wren, agree to effectively light the County Building and offices, or any other of the county institutions, but only to supply a certain number of lights.

The John A. Roebling's Sons Company are locating a branch of their business in Chicago.

Fairbanks, Morse & Co. will hereafter represent the Stanley incandescent light in the West.

The decision of the court just announced in regard to the matter between Mr. Stokes and some stockholders of the Postal Telegraph Company is in Mr. Stokes' favor, and he will be allowed to vote the stock in his possession.

The following is a record of late sales of electric light apparatus by the Western Electric Company: Plano, Ill., Steel Works, 10 lights; Sandusky Electric Light Company, 25 additional lights; Green Bay and Ft. Howard Electric Light Company, 25 additional lights; Bucyrus (Ohio) Electric Light Company, one new machine. Other orders of this company are a combined call and fire-alarm annunciator for a new hotel in Minnesota; a large annunciator for the new hotel of E. B. Weitzel, at Winfield, Kan.; a combined annunciator for the Hastings Improvement Company, Hastings, Neb.; annunciator for Holtz's new hotel, Huntington, Ind.; combined fire alarm and call annunciator for New Deming House, Chicago; 600 line telephone switchboard for Los Angeles, Cal.

Theo. P. Bailey, of the Western Department of the Thomson-Houston Company, reports the following: Michigan City, Ind., 23 lights; Marshfield, Wis., 20 arc and 50 incandescent lights; Galesburgh, Ill., 25 arc lights. He also reports that Terre Haute, Ind., which started last April with 50 lights, has now a plant with a capacity of 290 lights, 260 of which are in operation. One hundred and fifty of these are city lights and 110 commercial lights.

The Chicago branch of the Brush Company reports the following late sales: Iron Mountain, Mich., 30 arc lights; Oshkosh, Wis., for street lighting, two 40-light machines. The Taylor Building, Chicago which was injured by fire the night of Jan. 22, had just been wired by this company for incandescent lights. They are also putting in a street

and commercial plant at Columbus, Neb., and are making additions to their plants at Fond du Lac, Wis; La Crosse, Wis.; Aurora, Ill.; South Bend, Ind. They have also furnished a plant to T. A. Chapman & Co., Milwaukee, Wis.

The American Cushman Telephone Company has been incorporated at Springfield, Ill.

The authorities of Notre Dame have completed arrangements for introducing the Edison incandescent light into all the college buildings. In addition to the dynamo now in use, a much larger one has been ordered and will be put in position in a few days. Mr. Wilson, the electrician of the Edison Company, is now engaged in "wiring" the buildings, which will include the main building—Science Hall, the Academy of Music and St. Edwards Hall. During the past few months about 150 lights have been in use, but on the installation of the new plant the number will be increased to upward of 500. The electric light will supersede gas entirely in all the parlors, study-halls, class and lecture-rooms, as well as in the private rooms of professors and students.

The Indianapolis District Telegraph & Messenger Company, a local organization, are rapidly getting themselves in shape for business. Their offices are located on second floor over No. 13 South Meridian street. The main office fronting on the street is a large light, pleasant room. The battery room is just back of this, across a hall, and has stands for 400 cells of battery to begin with. They have 920 subscribers at present, and are about ready to begin putting in boxes. All inside wires have been run as lines were put up. The work has been delayed somewhat waiting for wire and instruments. The managers say they expect to have four circuits working in course of a week or ten days, and the other four or five as soon as work can be done. The box used is the old "American District," with some slight improvement. A rental of 50 cents per month is charged. Those in charge of the practical working of the system are men who have had experience, and will no doubt make a success of it.

The City Attorney is still considering the question of the right of the United Lines Telegraph Company to enter Indianapolis over the right of way granted to the Bankers and Merchants' Company two years ago. The prospects are that the decision will be favorable to the United Lines.

Mr. Louis Reibold, proprietor of the Bates House, Indianapolis, is putting in an Edison plant for incandescent lighting. There will be 350 lamps in all for the present.

The Citizens' Electric Lighting Company, of Frankfort, Ind., with a capital of $24,000, was incorporated this week.

A gentleman of Indianapolis, who has been in Green Castle, Ind., during the past week, tells me they have no gas or electric lighting company there, the streets and buildings being lighted by oil lamps. Green Castle, a city of about 4,000 population, is a lively, enterprising place. It looks as though a good electric lighting plant ought to be made a success there. W. A. K.

LAFAYETTE, Ind., Jan. 25, 1886.

The Brush plant at Lafayette, Ind., is among those installations which are taking a front rank for excellence of service, use of latest improved machinery and satisfactory earnings on capital stock. The company is at present operating sixty-two lights and has recently received an order for twenty lights to be placed in the Lafayette Car-Works, which is the largest manufacturing industry in that city. The plant of the Lafayette Company is situated in the heart of the city, and in a few days the company will be operating the incandescent lamps around the public square and among the business houses generally.

The growth of this company at Lafayette indicates the fact that that city is wide-awake and enterprising, and feels the necessity of keeping up with the times. It is generally regarded as a fixed fact that when the city's contract with the gas company expires (which will be in about a year), the Brush Company will be given the contract to light the streets of the city by electricity. The city and citizens have kindly feelings for the electric light company because high gas prices are a thing of the past: and the effort of the gas company to re-establish the old monopoly by trying to run out this lighting company will not succeed. ARC.

THE TELEGRAPH.

Earnings.—The gross receipts of the Mexican Telegraph Company for the week ended Jan. 9 were $3,285, and of the Central and South American Company $5,693.

Progressive Corea.—The first telegraph line in Corea was opened Sept. 27, and the electric light is about to be introduced into the royal palace. The King manifests great confidence in the United States.

An Unsafe Telegraph Building.—Building Inspector McCorkle reported on Jan. 23 that the five-story building used for telegraph batteries and offices, at No. 8 Dey street, has cracked front walls, cracked sills and lintels and cracked and rotten rear walls. The Western Union Telegraph Company, lessees, were ordered by Superintendent D'Oench to make it safe.

A Cable Mortgage.—The Commercial Cable Company filed a deed and mortgage in Register Murtha's office in Brooklyn, last week, authorizing Ernest Weiner Siemens and Johann Carl Ludwig Loeffler, of Berlin, Germany, to issue debenture bonds for £600,000. Part of the proceeds are to pay an existing debt of £337,000. A German syndicate is to advance the money.

A New Postal Company.—The Postal Telegraph Cable Company, the capital of which is $5,000, with right to increase, and the object of which is to establish telegraphic communication with various cities in the United States and Canada, has filed articles in this State. The incorporators are James H. Withington, A. W. P. Seaman, George Steel, George E. Kent and John O. Stevens.

The Sale Valid.—The application of Wm. R. Powers, as trustee for the owners of 940 bonds of the Bankers and Merchants' Telegraph Company, to have the sale of the property of that company, under the ten million dollar mortgage transferred by the Farmers' Loan and Trust Company to the United States Telegraph Company for $500,000 on July 30 last set aside, was denied in this city, on Jan. 21, by Justice Barrett, of the Supreme Court.

The Serial Building, Loan and Savings Institution.—An association, composed of telegraph operators, held an election of officers and directors last week. The following were elected: James Merrihew, President; E. F. Howell, Vice-President; A. R. Brewer, Treasurer; William B. Marsh, Secretary; J. B. Sabine, Attorney for New York; A. A. Rich, Attorney for New Jersey; directors, John Van Horne, D. B. Mitchell, Charles P. Burch, E. F. Cummings, M. J. O'Leary, W. B. Waycott, Gardner Irving, William Holmes, J. M. Phelan, George Dauler, and John Brant.

Returns for Taxation.—In the New York Assembly, Mr. Hill, of this city, has introduced a bill compelling "every telegraph company owning a line of electric telegraph partly within and partly beyond the limits of the State, to render for assessment and taxation (on or before the first Monday of December each year, in the city of New York) to the proper officers a true report of the cost to such company of their works within this State, and also within the various counties." It amends the general act of incorporation of this class of companies (introduced by Mr. Cullen in the Senate).

Stokes on Top.—A dispatch of Jan. 23 from Chicago says: Twelve of the stockholders of the Board of Trade Telegraph Company met at the Palmer House to-day and elected seven directors, five of whom are distinctly E. S. Stokes men. Robert Warren was chairman, and inspected the credentials and proxies of the gentlemen present. C. W. Brega protested against Henry A. Gardner, proxy for Mr. Stokes, being permitted to vote the 381 shares which Judge Moran yesterday decided that Stokes had a legal right to. The protest was tabled. Mr. Gardner represented 470 out of 750 shares of the stock, and voted them for E. S. Stokes, Dwight Townsend, Leander D. Parker, Henry A. Gardner, and Frank Gilbert. The holders of the remaining shares added C. W. Brega and J. M. Ball to this list of directors.

THE TELEPHONE.

A Substantial Concession.—Mr. Fred Ayer, one of the New England Telephone Company's committee to obtain new terms from the American Bell Company, is out with a letter in which he upholds the proposed new arrangement as a substantial concession, which he hopes to see accepted.

Output of Instruments.—It has been given out in some circles that the American Bell Company was losing its patronage and that the number of telephones in use was decreasing. From Dec. 20, 1885, to Jan. 16, 1886, the net output was 1,796, against 1,571 from Nov. 20, 1885, to Dec. 16, 1885, and 1,096 from Dec. 20, 1884, to Jan. 16, 1885.

The Validity Suit.—Acting Attorney-General Goode received from the Interior Department, on Jan. 22, all the papers bearing on the case of the Bell Telephone Company. He says that he will consider the matter at once, and he will probably direct the institution of a suit to test the validity of the Bell patents at an early date. He has not yet decided where the suit shall be brought, but is understood to prefer Washington as the most convenient place for the purposes of the Government. The Attorney-General has declined to take any part in the case, and has placed its entire management in the hands of the Solicitor-General.

Fixing Rates for New York.—In the New York Assembly, Mr Hagan, of this city, has introduced a bill providing that no telephone company in any city of over 800,000 population shall be allowed to charge a rental for the use of their instruments exceeding $5 per month. In other cities, towns and villages the charge shall not exceed $7 per month. Where two or more telephones are rented by an individual or company, the rental per month for each instrument shall not exceed $2.50. The tariff on messages between two villages or cities shall not exceed 15 cents for the first five minutes and 5 cents for each additional five minutes. The punishment for violations of the act is $100 fine.

Long-Distance Work.—The American Company, organized by the American Bell Company to do long distance telephoning, has 25 wires strung from Washington to Jersey City, and six experimental wires strung temporarily upon the poles of the New Jersey Telephone Company in that city. The 25 wires will be extended to New York city as soon as permanent permission is obtained to build through Jersey City, and then the service will be opened to the public. The experimental wires are reported working well, and, if the business between New York and Philadelphia proves remunerative, an extension of the service to other cities is probable. There is also an experimental line between Boston and New York, over which a whisper has been successfully transmitted.

New England Prospects.—It is claimed for the New England Company that the actual net earnings will compare far more favorably with those of previous months than an unofficial estimate has indicated. The failure of the company to issue the usual statements for October and November is the result of a decision to publish them only quarterly, and the change is made on account of certain rebates, etc., which prevent monthly statements from being entirely just exhibits. The December statement is not yet made up. The company is investigating to ascertain whether there has been an actual loss of revenue as a result of the advance in rates the past autumn. As nearly as can be asertained, the company earned in 1885 above operating cost (not including construction as operating expense) about 3 per cent. on the stock entitled to dividends under the old arrangement.

THE ELECTRIC LIGHT.

An Increase of Capital.—The Edison Electric Illuminating Company proposes to increase its capital stock from $1,000,000 to $2,500,000. The money is wanted for new construction.

Afloat.—Four new passenger steamers have recently been built in France for the General Transatlantic Line, running between New York and Havre. They are all lighted by electricity.

The Schafer System.—This system, for which such very large claims have been made in Boston, is said to light several shoe factories at Haverhill, Mass., and the railroad station at Concord, N. H.

The Robbins Company.—A meeting of the stockholders of the Robbins Electric Light Company was called for last week at No. 16 Broad street, this city. The company have no plant in operation for lighting purposes, but claim to be the owners of valuable patents. It is expected that several heavy capitalists will join them.

Why Not Use an Electric Motor?—A company has been formed, known as the Sea Cliff Elevated Railroad Company, Long Island, who are to build and operate an elevated railroad from the Sea Cliff Station to the "Cliff," a distance of two and a half miles. They also intend that the engine used in operating the railroad, which will be a cable road, shall run the dynamo to furnish the village with electric lights.

Incandescent Patents in Germany.—A Leipzig correspondent writes that in the patent suit, Swan *vs.* Edison, the Swan Company has withdrawn its appeal before the Court at Leipzig, after the report of the referee, Justizrath Hambrock, had been communicated to the court and the parties, so that the recognition of the Imperial Patent Office, which had been claimed by Edison for nearly two years, is at last legal. As there was no occasion for a decision respecting Edison's counter claims, these will be allowed to drop. The Swan Company declares that it will continue the pending civil proceedings in the Berlin Court.

Ten Companies Organized.—At Albany, N. Y., on Jan. 23, Samuel H. Willard, L. M. Balis, Henry C. Adams, A. B. Chandler, John J. Kiernan, F. K. Horn and Edward H. Goff filed with the Secretary of State ten certificates of organization of the American Illuminating Company. The places business is to be carried on in and amounts of capital of each local organization are: New York City, capital $300,000; Brooklyn and Harlem, each $100,000; Newburg, Cohoes, Syracuse, Yonkers, Watertown, Long Island City and Ogdensburg, each $30,000. The object is the manufacture, generation, utilization and sale of electricity and the furnishing of it for light, heat, power or other purposes.

Sports by the Bright Light.—A unique project is afoot to light up a great pleasure ground on Staten Island so that games of base-ball, tennis and cricket may be played as well by night as by day. Several thousand small electric lights are to be placed in trenches in the ground; these trenches to be covered with stout wire netting placed on a level with surrounding portions. The class of light to be used is the incandescent, "which burns, or rather glows, in a vacuum and hence cannot set fire to anything. Indeed, there is no fire in these little incandescent globes, for, from the nature of the light, there is no combustion going on." On this ground play will not be forced to end at sundown, but may be continued as long as desired.

Pittsburgh, Pa.—An answer has been filed in the Court of Common Pleas, No. 2, of Allegheny County, in equity, by the defendant in the suit of the Brush Electric Company and John E. Ridall against the Allegheny County Light Company. It deals with the various points as to violation of agreement, etc., and says: "Defendant specifically denies that plaintiffs are entitled to maintain their bill, and avers that the matters therein stated are only cognizable at law, and that plaintiffs have a full, adequate and complete remedy at law for the various matters alleged, and it specifically denies that Ridall, being an officer of defendant, can maintain this bill, or have or receive any pecuniary or other advantage resulting from the transactions referred to therein, nor is he entitled to any decree, either in his favor or in connection with his co-plaintiff." Mr. H. H. Westinghouse is President of the defendant company; Mr. S. A. Duncan, superintendent; and Mr. R. D. McGonigle, secretary. Mr. Ridall has been vice-president and business manager.

PERSONALS.

Mr. Thomas D. Lockwood has been invited by the Minnesota State Board of Education to repeat at Minneapolis his electrical lectures recently delivered before the Lowell Institute in Boston. He is unable, however, from lack of time, to comply with the wish.

Dr. Rossiter W. Raymond, member of the Brooklyn Board of Commissioners on Electrical Subways, and lately elected a delegate to the Kings County Republican General Committee, has resigned from the latter body on account of his connection with the former. His position as a commissioner will bring him into intimate relations with the present Democratic City Hall, and he does not wish to be hampered by any Republican partisanship. He finds, in fact, that he has not the time to look after both lots of wires.

Major G. McFall, of the Brush Electric Illuminating Company, will become Secretary of the Brush-Swan Electric Light Company, upon the retirement, on the 1st of February, of Mr. C. P. Whitney, who has been in the service of the Brush system in this city for the past six years, thus earning the generous compliment of a four months' vacation granted him by the company—without change of address. Mr. Whitney still continues as agent for the Detroit Iron Tower Company in this territory, and for both it and the Brush electric light system in Spanish America, where he has other business interests.

MISCELLANEOUS NOTES.

The Faraday Electric Cable Company, of New York City, has been incorporated with a capital of $100,000.

Against Permanent Wire Privileges.—A bill has been introduced in the New York State Assembly, by Mr. Babcock, of Ontario, providing that there is nothing permanent in the possession taken by a telegraph company of buildings or lands for the attachment of its wires or the erection of its poles. The bill declares that "Whenever any wire or cable for telegraph, telephone, electric light or other electrical purpose, or for communication otherwise than by the aid of electricity is, or shall be attached to, or does or shall extend upon or over any building or land, no lapse of time whatever shall raise a presumption of any grant of or justify a presumption of any perpetual right to such attachment or extension."

Electricity in Medical Practice.—At a meeting of the French Academy of Medicine, held recently, M. Brondel read a paper on the introduction of certain medicines into the system by means of electricity. If the electric current is made to pass through a solution of a salt, the salt is decomposed, the metallic base passing to the negative pole, and the acid, or metalloid, to the positive pole. The iodides are easily decomposed by electricity. In order to introduce iodine into the system, a rubber plate, moistened with a solution of iodide of potassium, is placed upon the surface of the body. Over this plate the negative pole of a battery is applied, while the positive pole is placed upon a part of the body toward which it is desired that the iodine should travel. The iodine separates from the potassium, which remains at the negative pole, and passes with great rapidity through the tissues toward the posi-

tive pole. This may be demonstrated by testing with a starched paper, which becomes blue. A great number of substances can thus be made to traverse the tissues, and the applications of this discovery are numerous and important.

Books Received.—Two useful and important additions have been made to the *Electrician* series of manuals. One is "Electro-Chemistry," by Dr. Gore, price 80 cents, a very handy, compact and thorough work, giving the chief principles and facts of electro-chemistry, and specially useful to the electro-metallurgist or the electroplater. The other is "Alternating Currents," by T. H. Blakesley, M.A., price 60 cents, being a reprint of papers published by our London contemporary. It is intended to exemplify the use of the geometrical method in treating problems that involve the flow of electricity arising from the existence of sources of electromotive force, whose intensity undergoes harmonic variation. A third new English book is the "Manual of Telegraphy," by Mr. W. Williams, Superintendent of Indian Government Telegraphs, price $4.20. It is a handsome work of 327 pages octavo, with nearly a hundred cuts, and is based upon the papers set by the author for official examinations. Any one who masters its contents can fairly call himself a telegraph engineer. All the above books can be obtained from this office, at the prices named, postage free.

APPLICATIONS OF POWER.

Boston, Mass.—Several plans for rapid transit are now before the citizens of Boston, who are greatly dissatisfied with horse cars. It is noticeable that many of the plans include the use of electric motors, and that the newspapers generally favor electricity as the motive power to be used.

SPARKS AND FLASHES.

And Wants it for Nothing.—I notice the fellow who is too old and worn-out to enjoy anything is always telling about the good old times. I notice the same fellow makes just as much use of the telephone as any modern chap.—*Ex.*

Which is the Under Dog?—According to the Controller there is a serious question now pending as to whether the State of New York is "a bigger man" than the Western Union Telegraph Company. The Legislature ought to proceed on the line of action suggested by the Controller to settle this important point. We are disposed to bet on the State of New York, though it is whispered that some members of the Legislature really belong to the telegraph company.—*Rochester Post-Express.*

All the Same.—Sam Archives, of St. Louis, uses the telephone a great deal and gives the Central Office clerks much trouble. There is telephonic connection between St. Louis and Chicago, and Sam telephones to Chicago about fifty times a day. "Hello, Central Office," yelled Sam about the twentieth time in an hour one day last week. "Hello! gimme Chicago." "I'd like," replied the irritated Central operator, "I'd like to give you hell." "All right, switch it on, same thing."—*Ex,*

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—Am. Dist., b 31¼; B. & M., b 2, a 3; Western Union, b 68⅞, a 68¾.

Telephone.—Am. Bell, b 161, a 162; Erie, b 32; New England, a 34¼.

Electric Light.—Edison, b 150.

BUSINESS NOTICES.

Telephones cum-Telegraphs.—Send for circular to Dr. Rosebrugh. Toronto, Canada.

Mechanical Telephone Exchange.—Send for circular to Dr. Rosebrugh, Toronto, Canada.

Pens out of Order.—Stylographic or fountain pens out of order in any way should be sent or taken to J. Ullrich & Co., 106 Liberty street, who will put them in good condition at reasonable rates.

The Callender System.—The Callender Insulating & Waterproofing Company, Mills Building, this city, have issued a very neat and useful vest-pocket catalogue of their well-known insulated wires and cables manufactured by them at their Newark works. The wires and cables are all carefully numbered in classes, with full information as to gauge (B. & S.), price, etc. The company also stand ready to manufacture, at the shortest notice, insulated wires and cables to any specification and to suit any system. They have just completed a large contract for the Edison Company, at Brunswick, N. J.

Dean's Rheumatic Pills
Are a sure cure, a superior remedy, almost infallible; 50c.
HALE'S HONEY, the great cough cure, 25c., 50c. and $1.
GLENN'S SULPHUR SOAP heals and beautifies the skin; 25c.
GERMAN CORN REMOVER kills corns and bunions; 25c.
HILL'S HAIR AND WHISKER DYE, black and brown, 50c.
PIKE'S TOOTHACHE DROPS will cure in one minute; 25c.

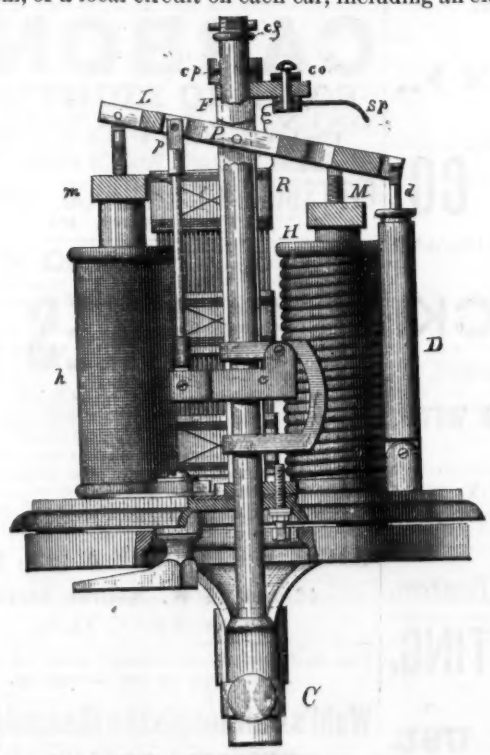
OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS.

PATENTS DATED JANUARY 12, 1886.

334,014. Automatic Circuit Changer; Ezra T. Gilliland, Boston, Mass., Assignor to the American Bell Telephone Co., of same place. He places at one terminal station of the village system an automatic circuit-changer, consisting of a motor-driven arm forming the terminal of the electrical circuit extending to the distant station. In this circuit is located an electro-magnet controlling the said motor. The circuits of the village system terminate in spring-fingers, all but one normally resting upon a ground contact. The circuit-changer, when in its normal or unison position, rests with its arm in contact with the first of the circuits of the village system, which is thereby raised from its ground contact, the two lines thus forming one compound circuit. Electrical impulses from the distant station release the motor.

334,020, 334,021, 334,022. Electro-magnetically Operated Air Brake for Railway Cars. The first consists of a pair of valves arranged in the lines of communication from a power-chamber to a brake-cylinder, and from the latter to the external air, in combination with electro-magnets in separate circuits or branches, with apparatus for making and breaking such separate circuits or branches, so as to shift such valves either simultaneously or independently, whereby either of said valves may be held open or closed, or both held closed or both open.

The second consists of separate inlet and exhaust valves for controlling the admission of pressure to the brake-cylinder and the exhaustion of pressure therefrom, of a local circuit on each car, including an electro-

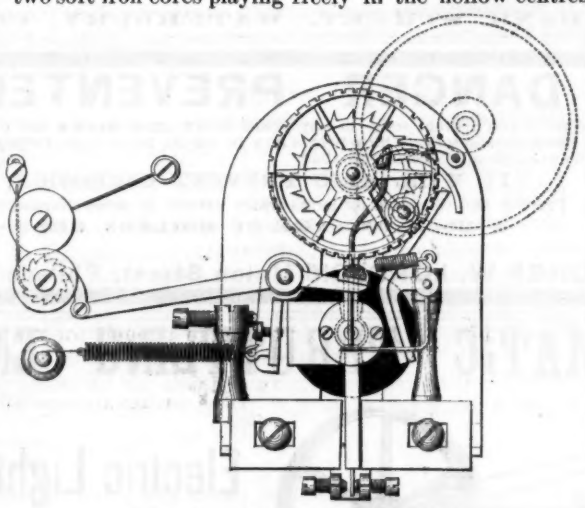


334,023. ARC LAMP REGULATOR.

magnet for controlling the inlet-valve and an independent electro-magnet for controlling the exhaust-valve, a main circuit extending throughout the train, and switch devices operated by the manipulation of the current in the main circuit for cutting in or out either or both of the valve-magnets.

In the third he claims a cell for containing the elements and electrolyte of secondary and other galvanic batteries, the same being of vitrified clay of the described composition—that is to say, a composition of silicate of alumina and silica in about equal proportions, with a small amount of fusible silicates mixed therewith.

334,023. Arc Lamp; James A. Jenney, Fort Wayne, Ind., Assignor to the Fort Wayne Electric Light Co., same place. Consists, as shown in the cut, of two coarse-wire helices *H H*, set in the main circuit, with currents flowing through them in contrary directions; two soft iron cores playing freely in their hollow centres and joined in one piece at the top, so as to constitute a single soft-iron magnet *M*, with its poles in said cores; two fine wire helices set in a shunt-circuit, with currents flowing through them in contrary directions; two soft iron cores playing freely in the hollow centres



334,294. PRINTING TELEGRAPH.

of the same, and joined in one piece at the top, as the others, so as to constitute a single soft iron magnet *m*, with its poles in said cores; a lever *L*, pivoted at *P* on the frame *F*, and carrying said soft-iron magnets *M* and *m*, the clutch *c* and the piston *d* of the dash-pot *D* and the resistance-stack *R*.

334,062. Overhead Conductor for Electric Railways; Charles J. Van Depoele, Chicago, Ill. Consists of a car and a vertically-yielding contact roller or brush, a suspended conductor, and means, as shown in the cut, for adjustably supporting the same in a practically horizontal plane.

334,069. Acoustic Telephone; Charles D. Bentley, Eaton Rapids, Mich. He provides a signal bell adapted to be rung by vibrations sent over the wire.

334,073. Arc Lamp; George A. Gage and Cushman W. Crary, Chicago, Ill. Consists of the combination of numerous elements forming a mechanical feed in the place of the ordinary magnetic feed.

334,142. Incandescents; 334,143. Circuit Controller; 334,144. Arc Lamp; 334,146. Incandescents; 334,147. Incandescents; Edward Weston, Newark, N. J., Assignor to the United States Electric Light Co., New York, N. Y. The first consists in compressing sheets of non-fibrous cellulose to the maximum thinness and then cutting filaments therefrom and carbonizing the same. The second consists of a short section of pipe constructed in a manner to be readily inserted in a length of pipe by cutting the latter and securing the ends to the section, in combination with insulated terminal contacts secured within it, and a circuit-breaker adapted when fitted into the said section to make or break connection between the terminals, according to the position of the key and separable contact surfaces.

The third consists of feed-controlling main and shunt circuit helices and magnets, a pivoted armature frame or lever, two sets of carbons; and clamps or clutches for controlling feed and adjustment, of a floor of varying height for tripping said clamps, and means for shifting the same operated or brought into operation by an abnormal strengthening of the shunt helix or magnet, and the movement of the armature-lever produced thereby.

The fourth relates to enlarging the ends of the filaments, and especially to the apparatus consisting of two independent pairs or sets of clamps adapted to grip or bind the carbon at and near its ends, as described, of bars or levers connected therewith and adapted to open or control all of said clamps simultaneously or by a single operation.

The fifth is shown in the cut, and, as far as the apparatus is concerned, the process consists in revolving a lamp, any imperfections showing themselves by bright lines across a comparatively dark surface.

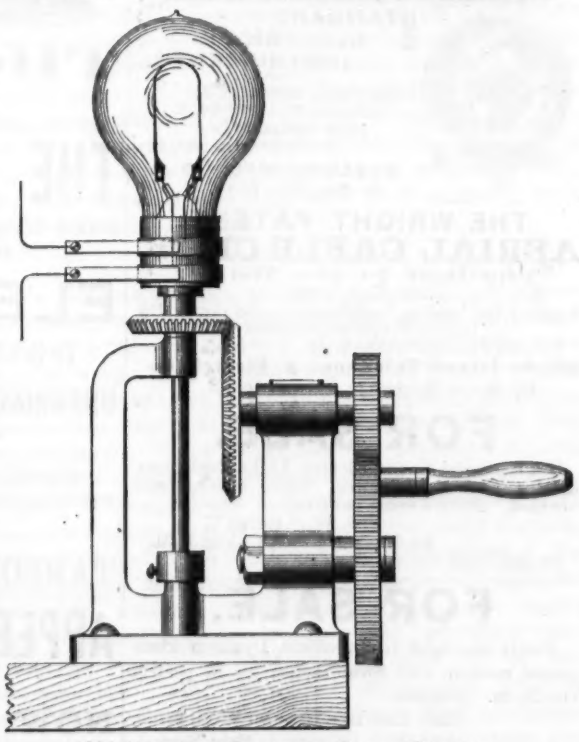
334,185. Polarized Relay; 334,186, 334,187, 334,188, 334,189. Railway Car Telegraph; Lucius J. Phelps, New York, N. Y. The polarized relay consists simply of a thin plate of soft iron or armature mounted in upright position directly upon the mass of iron forming its charging-pole, and preferably provided with knife-edge bearings.

In the second he has a claim upon transmission of telephonic speech between a moving object and a fixed station.

The third consists of an open-circuit line-conductor, a plate or surface upon the vehicle movable on a line parallel with the conductor and connected to earth, and a transmitting apparatus whose back or normal and front or transmitting stops are connected one with the earth directly and the other to earth through a source of electricity, whereby signals may be transmitted through the charge and discharge of the line-conductor effected by connecting the same to the source of electricity to receive a charge and then to earth to be discharged.

The fourth consists, in the combination, with the line-conductor, or with the plate or inductive surface carried by the car or vehicle, of a telephone-transmitter and a battery or other source of electricity connected to the line or to the plate, the transmitter being suitably constructed to alternately charge the line with electricity from the battery and then to discharge the line in whole or in part through a connection between the same and the earth.

The fifth consists of a line-conductor parallel to the



334,147. INCANDESCENT LAMP TESTING.

path over which a vehicle moves and a conductor upon the latter arranged in inductive proximity to the line-conductor, and terminating in the opposite poles of a condenser.

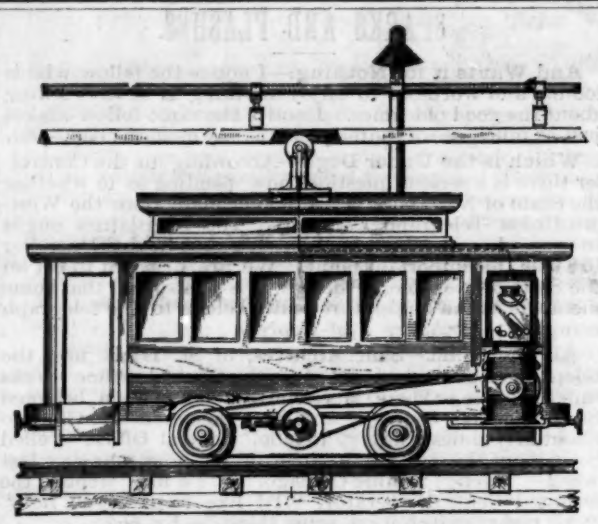
334,294. Printing Telegraph; Robert J. Sheehy, New York, N. Y. The escapement-anchor is pivoted at one pole of an electro-magnet, and is constructed with an extension of magnetic material, which receives from the electro-magnet a given polarization when the coils o the electro-magnet are traversed by currents in a given direction. The polarity of the extension is reversed when the direction of the current is reversed. The extension preferably constitutes a portion of the core of the electro-magnet by being constructed with an arm which passes within the coils of the same. The portion of th extension without the coils passes between two magne

poles formed by the arms of a permanent magnet. The alternating north and south polarization of the extension of the escapement-lever causes the latter to be driven to and fro by reason of the attraction and repulsion established between the extension and the poles of the permanent magnet.

334,317. Arc Lamp; Frank G. Waterhouse, Sacramento, Cal. Consists of two lamps arranged in branches of the main circuit, one lamp being of the class known as "series lamps," provided with a main and a shunt magnet which act in combination to maintain the proper separation of the carbons, and the other lamp provided with a main-circuit magnet for causing a separation of the carbons, and a magnet for causing the feed of the carbons included in the combined main and shunt circuit of the series lamp.

334,365, 334,366. Electric Lighting Apparatus; Arthur C. Ferguson, Saratoga, N. Y. In the first he rotates two or more springs which press against and escape from contacts, the springs and contacts being in an electric circuit.

In the second, he mounts the electrodes in pairs and moves one or both of them for making and then breaking contact and developing sparks, and he arranges these



334,062. ELECTRIC RAILWAY CONDUCTOR.

pairs in the lines to be illuminated and closes and separates the same successively along such lines, so that the flashes follow each other with sufficient rapidity to cause a line of illumination and produce an image of letters, designs, etc.

334,380. Electric Alarm; Charles H. Hilton, New Haven, Conn., Assignor of two-thirds to Ellis B. Baker and Robert D. Blish, both of same place. Consists of two oscillating detent-heads supported, respectively, on arbors journaled in the frame, connected by engaging rock-arms, and so adjusted that one detent is turned out of the path of the escapement-arm of the bell-striking mechanism as the other detent is turned into the same, thereby releasing and interrupting the movement of the arm.

334,399. Fire Alarm Indicator; Willie C. Walter, Richmond, Va., Assignor of two-thirds to George B. McAdams, of same place. Consists of the registering mechanism, mechanism for automatically holding the fire alarm in check while the hour is being struck, by breaking the local circuit in which the fire alarm is situated at the moment when the hour is to be struck, and holding the said circuit open until the striking of the hour has been completed.

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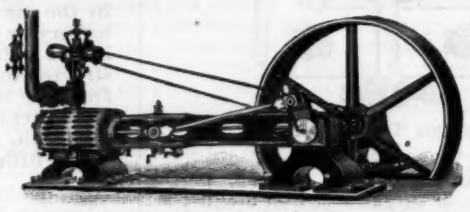

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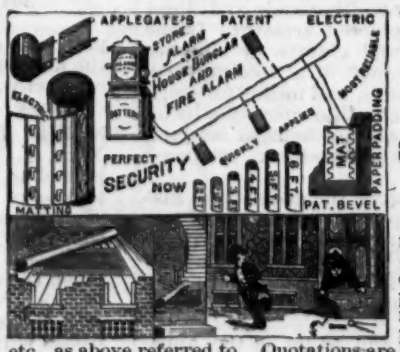

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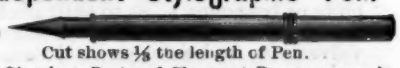

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